VOLUME XIV APRIL 1921 NUMBER 4

Southern Medical Journal

Journal of The Southern Medical Association

Published monthly at Birmingham, Alabama. Annual subscription $3.00. Entered as Second-Class Matter at the Postoffice at Birmingham, Alabama, under Act of March 3, 1879.

SOUTHERN MEDICAL ASSOCIATION
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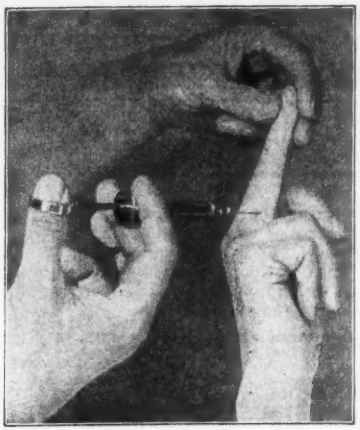

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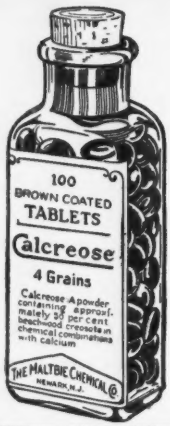

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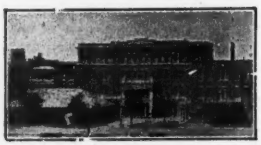

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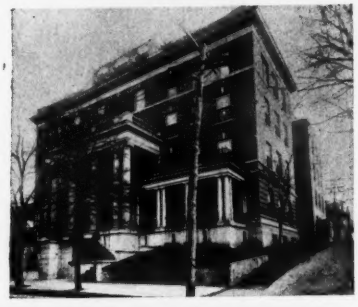

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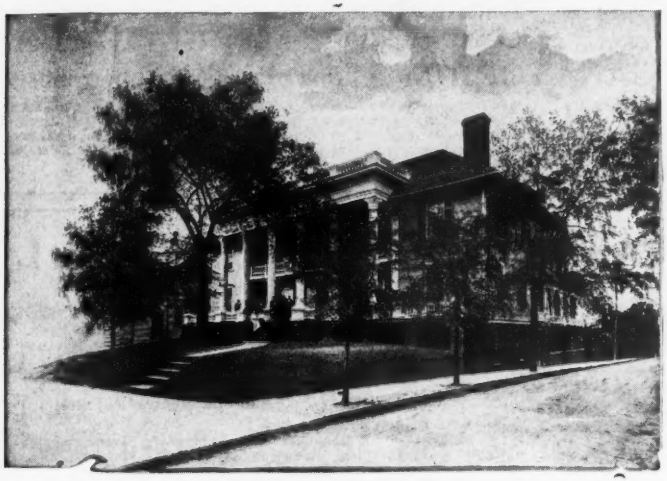

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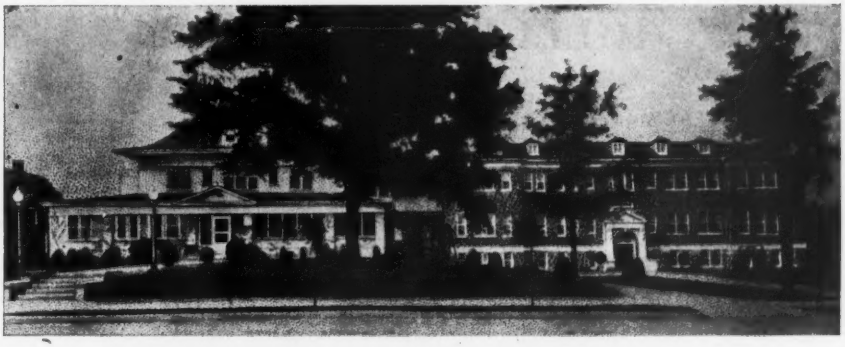

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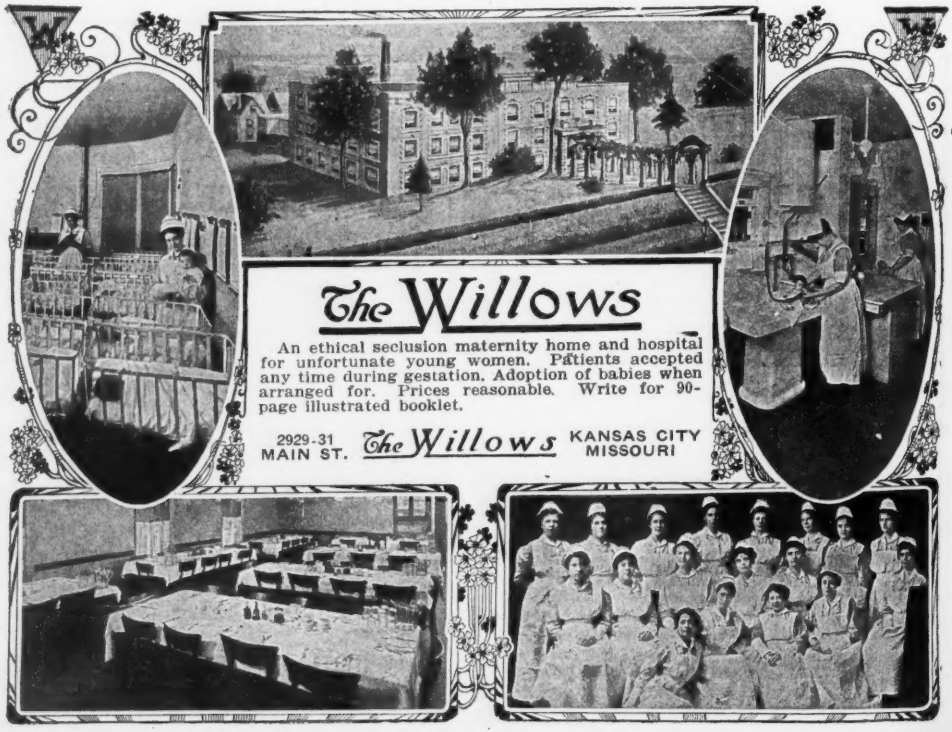
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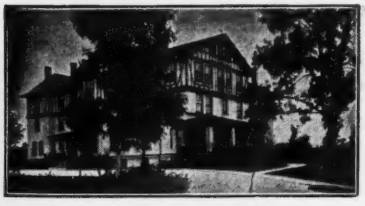

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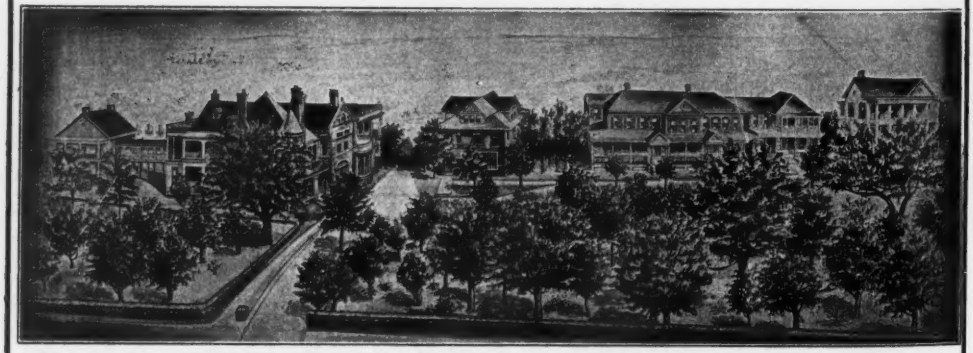

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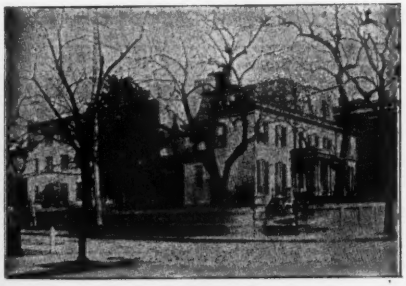

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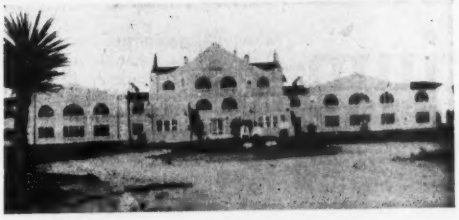

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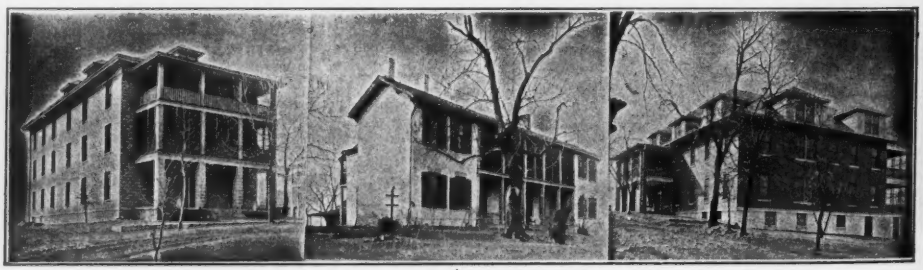

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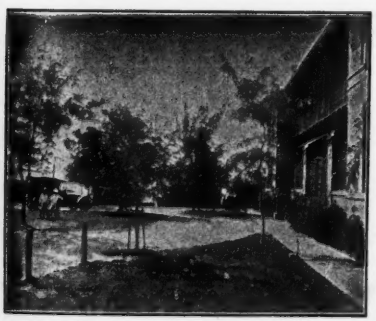

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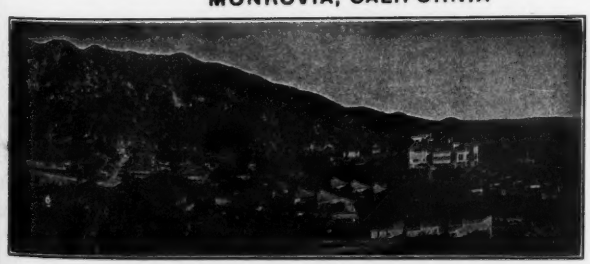

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SOUTHERN MEDICAL JOURNAL

JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

PUBLISHED MONTHLY AT BIRMINGHAM, ALABAMA

Volume XIV APRIL 1921 Number 4

MEDICINE

INTERNAL DISEASES, PEDIATRICS, NEUROLOGY, DIAGNOSTIC METHODS, ETC.

SOME OBSERVATIONS ON SPRUE AND ITS PREVALENCE IN THE SOUTH*†

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The history of sprue can be traced back to as early a period as 1766, when Hillary, an English surgeon practicing in the Barbadoes, described a number of cases of so-called "white diarrhea," which bear a close resemblance to the disease as we know it today. For nearly a century following this, no further reference to the malady can be found in the literature, though there is no reason to believe that the disease has not existed for indefinite periods of time in many if not all tropical countries. Much of the early history has no doubt been lost in a confusion with other tropical conditions of somewhat similar clinical nature, such as pellagra and hill diarrhea, while the recent records have been obscured in a maze of complicated nomenclature, including such terms as Ceylon sore mouth, scorbutic diarrhea, cachexia aphthosa and endemic diarrheas of warm countries.

The word "sprue" is an English corruption of the Dutch "spruw," a term applied by the natives of Java to characterize the constant presence of mouth lesions.

The first accurate description of the disease appeared in 1853 in a paper published in the "Indian Annals of Medical Science," by Alexander Grant, an English surgeon. Grant drew a parallel between the hill diarrhea, then, as now, prevalent in certain districts in India, and another group of cases of so-called diarrhea alba, corresponding to our present conception of sprue.

In 1880, Sir Patrick Manson published a series of "Notes on Sprue," describing a number of cases he had observed during a sojourn in southern China. This constituted the first definite use of the term "sprue" in the English literature.

Since then, and up to the present time, numerous case records have appeared emanating principally from the tropical regions of the East, where the disease prevails most extensively. The presence of sprue in the Western Hemisphere, although hinted at by Hillary in 1766, has nevertheless been accorded rather tardy recognition. This is plainly evident from a statement made by Carnegie Brown, a thorough student of the disease, as late as 1908, to the effect that it was questionable to his mind whether genuine sprue ever originated in any part of the world except in the tropical and subtropical region of the countries of eastern Asia and the Malay Peninsula. Probably the first appearance of sprue recorded in the United States was made by Graham, of Savannah, Ga., in 1905. Shortly after, Harris, of Atlanta, published an account of a number of cases which he found to have originated in Georgia. In 1912, Wood called attention to

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†President's Address, Southern Gastro-Enterological Association, meeting conjointly with Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

the confusion then existing between pellagra and sprue, a mistake that Searcy, of Alabama, had fallen into some time before in describing a number of cases as pellagra which belonged most probably under the diagnosis of sprue.

In 1911, the writer reported a case of probable sprue before the American Society of Tropical Medicine which presented a number of interesting details:

The patient was an American male who had resided several years in Porto Rico and who returned to this country in an almost moribund state. The probable diagnosis of sprue was made from the typical mouth lesions and characteristic type of stools. Unfortunately, a post-mortem could not be obtained in this case, although the clinical history and physical signs, to my mind, pointed unmistakably to sprue. In the course of the discussion which followed the presentation of this case the point was stressed by those in attendance that the condition was possibly of pellagrous origin. A vigorous denial was uttered to this by a medical missionary from China, who happened to be present at the meeting and who proclaimed that he himself was at the moment a victim of sprue and was thoroughly familiar with its clinical manifestations. In order to stress his views more forcibly, he offered to demonstrate, then and there, the typical mouth lesions of the disease for the benefit of the Society.

The most important contributions to the study of sprue in the Western Hemisphere have come from our Army officers in Porto Rico. As early as 1909, Ashford became impressed with the great prevalence of the disease in that country which had paraded for a long time under the native Spanish term "descomposiciones del intestino" or decomposition of the bowels. Ashford soon came to the conclusion that sprue was one of the genuinely common tropical diseases of Porto Rico and made it a subject of special study both from the standpoint of its clinical manifestations and its etiology.

Similar studies made in other countries within the West Indies group would probably exhibit as great incidence of the disease as has been shown to exist in Porto Rico.

The extent of the distribution of sprue within the subtropical sections of our own country has not, up to the present time, been accurately measured. In 1915 Wood, of Wilmington, N. C., gathered the records of all published cases in this country up to that time and expressed himself as strongly imbued with the belief that the disease remained, for the most part, unrecognized and existed to a far greater extent among us than was indicated by the few scattered case reports. My own observation within recent years has led me to similar conclusions.

During the past four months three cases have come under my observation in each of which the disease apparently originated within the states of Louisiana and Mississippi. The clinical details of these cases, I believe, upon careful analysis will demonstrate their identity to sprue as described by those who have become familiar with the clinical aspects of the disease in the tropics. My main purpose in dealing with the subject at the present time is to call renewed attention to the existence of the disease within our midst in the South and to make a further plea for a greater degree of alertness in detecting its presence. To promote efforts along this line, a brief summary of the chief clinical features of the disease may not prove altogether without value.

CLINICAL FEATURES

The clinical features of sprue are in general quite characteristic and, under ordinary circumstances, no difficulty should be experienced in differentiating the disease from other morbid conditions affecting the digestive tract. In a well advanced case, four cardinal groups of symptoms may be recognized:

1. An intensely red, desquamated, raw-beef type of tongue, accompanied in most instances by a general ulcerative stomatitis.

2. A greatly inflated abdomen, doughy in consistency, with enlarged intestinal coils often visible through the thinly stretched abdominal wall.

3. A chronic fermentative type of diarrhea characterized by unusually copious, pale-yellow and foul-smelling stools.

4. A progressive deterioration of strength, accompanied in most instances with marked pallor.

The symptom picture is by no means constant. It shifts from one section of the digestive tract to another in a most irregular manner. The diarrhea, for example, will be found at times to subside for periods of weeks, during which time

the tongue will frequently break out with most intense signs of irritation. Some authors refer to these intermittent phases of the disease in terms of "tongue sprue," "gastric sprue" or "intestinal sprue," depending upon the particular part of the digestive tract which, for the time being, is in a state of eruption. I have seen a raw, bleeding and highly irritative type of tongue suddenly assume a smooth and shiny appearance and return to an almost normal state within a space of two or three days. This rapid progression and retrogression of lesions affecting various parts of the digestive tube serve to differentiate the disease from other similar morbid states of the gastro-intestinal canal, such as pellagra.

While the above is fairly representative of the well established disease process, it should be understood that during the earlier stages the manifestations are rather insidious and uncertain. The patient, as a rule, first appears with a history of some simple and apparently trivial derangement of the digestive tract, complaining, perhaps, of a mild, evanescent type of stomatitis, or of a passing fermentative dyspepsia, accompanied by a diarrhea of pale stools with particularly foul odor. Again, it is the increased feeling of weakness or dizziness, often with pallor, that prompts the patient first to seek medical aid. It is of great importance to recognize the disease during these early phases, if possible, since treatment is much more effective than during the advanced or terminal period.

The clinical manifestations to be sought for in the diagnosis may be found under the following heads:

Mouth and Tongue.—The onset of the mouth lesions constitutes usually the first evidence of the disease to attract attention of the patient. Upon careful questioning, however, a mild type of diarrhea will, as a rule, be found to have existed for some months prior to the outbreak of the disturbances in the mouth.

The tongue in sprue, while not definitely typical, is, upon the whole, rather distinctive. It is firm and usually smaller than normal. During periods of acute exacerbation the epithelial coating is found almost completely denuded, leaving a raw, granular-like surface which shows a tendency to bleed upon the slightest trauma. The papillae often suffer complete effacement and, eventually, deep fissures make their appearance upon the dorsum and extend over the borders and under surface. Isolated ulcers are rare upon the tongue, though not infrequently the buccal mucosa will show irregular ulcerative patches of the aphthous type. There is a sensation of burning in the mouth with diminution of secretion and consequent dryness. The patient complains bitterly of the distress experienced when food is taken, especially in the presence of articles of a sapid pungent character. In many instances, as mentioned previously, the mouth and tongue lesions subside suddenly and without apparent cause, with a coincidental outbreak of gastric and intestinal disturbances, substituting, as it were, one distressing set of symptoms for another.

Stomach.—A burning sensation in the epigastric or substernal region is commonly present at certain periods. This is caused by a hyperesthesia of the gastric mucosa since the gastric juice itself is usually found to be sub-acid in sprue. Nausea may also be complained of, though vomiting is rare. Ashford mentions two instances of severe hematomesis among his cases caused, he believed, by capillary oozing from the denuded stomach mucosa.

Intestinal Tract.—From the proctoscopic appearance of the lower segment of the bowel, it is evident that the lesions in the intestinal tract are of quite similar nature to those found on the tongue. Here again one finds a denudation of the epithelial layer resulting in a raw, excoriated mucosa. Different segments of the bowel are affected in this manner so that while the small intestine becomes the seat of eruption, so to speak, the large intestine may be comparatively free of active lesions, or vice versa.

The diarrhea which attends the localization of the disease along the intestinal tract is of a highly characteristic nature. The evacuations occur mostly during the morning hours, affording the patient comparative relief during other periods of the day. Tenesmus is rarely present and there

is likewise a singular absence of intestinal colic. The stools are extremely voluminous, often occasioning surprise on the part of the patient who can not understand where the quantity can come from considering the comparatively small amount of food ingested. The copious character of the stool, however, is more apparent than real since it consists, for the most part, of froth or gas bubbles. The stool, as a whole, is homogeneous and rather gummy in consistency, which is due to an intermixture with mucus. The color is pale-yellow to grayish-white and the odor is markedly fetid. The absence of color suggests a deficiency of biliary secretion, but chemical analysis shows the presence of bile in normal quantities. The stools vary in number, but seldom exceed six to ten within twenty-four hours.

The microscopic examination of the stool reveals the presence of an increase in the fat elements, mostly in the form of fatty acid crystals and soaps. Authorities differ as to the fat content of the sprue stool, but the average percentage is 75, showing the great deficiency in absorption. The carbohydrate and protein elements of the food do not, as a rule, appear in abnormal amounts in the stool. In addition to the increase of fat, great numbers of yeast cells are commonly to be found in the fecal contents.

Liver.—With the advance of the disease, the liver shows a progressive decrease in size. This is the result of atrophic changes involving the organs as a whole, and a shrinkage is generally unifrom. No nodulations appear and, in fact, cirrhotic changes are entirely absent. The patient likewise experiences no sensation of discomfort in the liver region and there is no objective evidence of interference with the circulation.

Pancreas.—On post-mortem examination the pancreas is seldom found to be involved in typical cases of sprue. It is necessary to call especial attention to this fact because in certain types of pancreatic disease the stools may assume a character quite similar to those found in sprue. There is, upon the whole, little justification for the belief held in some quarters that the pancreas plays a direct role in the etiology of the disease. Most authorities agree that the pancreatic ferments are usually present in normal amounts in the feces in sprue.

In a special study of the three cases recently observed by me, I was not able to demonstrate a deficiency of the pancreatic enzymes either by direct aspiration of the duodenal contents or by examinations made with specimens of the voided stools.

Anemia.—In the majority of instances chronic sprue is attended by a marked decrease in the number of red blood cells and hemoglobin content. Ashford estimates the average count as three to four million reds with 51 to 75 per cent hemoglobin. In the three cases that came under my observation, the anemia was of more marked degree, in one case registering as low as one million and a half reds with 40 per cent hemoglobin. The disease, in fact, is not infrequently confused with pernicious anemia, a point that has been especially stressed by Wood in a recent contribution. Is it not possible after all that many of the so-called cases of chronic or pernicious anemia in our section, accompanied by mouth and intestinal lesions, are, in fact, of sprue origin? This point is worthy of serious consideration by Southern physicians.

ETIOLOGY

The cause of sprue has given rise to considerable discussion almost since the time of the recognition of the disease as a distinct entity. The early investigators laid particular stress upon the dietary, believing certain types of food played a role in the etiology of the disease. While it is true that the dietary does assume considerable importance in the therapeutic management of the malady, proof is lacking that the disease owes its origin to any special food element or to a deficiency in vitamin content as is the case with pellagra or beriberi. The morbid lesions bear evidence of a microbic origin, though careful examinations of the stools by competent observers have shown an absence of specific organisms, either bacterial or protozoal.

In 1915, Ashford claimed the discovery of a new species of Monilia which he found

uniformly present in the scrapings from the tongue in a number of patients suffering with sprue in Porto Rico. A short while previous to this Bahr, after long study of the disease in the East, had reached the conclusion that the morbid lesions resulted from infection with the Monilia albicans, a type of yeast fungus commonly associated with thrush. Bahr's conclusions met with considerable opposition, especially in England, since it was difficult to conceive that a fungus of such universal distribution as Monilia albicans could assume so great and otherwise unexplained virulence solely within the tropics. Ashford's organism, while closely related to the Monilia albicans morphologically, represents, however, a new and entirely distinct species.

This organism, named by Ashford "Monilia psilosis," reproduces by seed-buds and terminal conidia from specialized hyphae as well as by budding from yeast forms themselves. In cultures, chlamydospore-like bodies are frequently found present, while ascospores are never observed. The yeast cell itself is from two to seven microns in diameter and presents a clear outline. Within the cell plasm a large, refractile body and a vacuole can often be made out. The mycelial threads are usually present in large numbers in culture specimens and vary considerably in size. The organism grows best in Sabouraud's glucose agar. Fermentation tests on glucose and other sugars yield positive reactions, but no acidity takes place with litmus milk. The best cultures are obtained from scrapings from raw, desquamated tongue surface. A similar fungus was found by Ashford in a number of specimens of bread examined by him in Porto Rico, a fact which would seem to indicate a causal relationship in some cases to the eating of contaminated bread.

Ashford's conclusions have not as yet been entirely confirmed, although from a clinical standpoint the evidence appears convincing. The morbid lesions are not unlike those found in other forms of blastomycotic infections. And the chronic, irregular clinical course of the disease is certainly quite characteristic of this type of infectious process.

TREATMENT

Considerable difference of opinion exists in regard to the proper method of treating the disease. The usual plans of treatment adopted in ordinary diarrheal conditions are not applicable, as a rule, to sprue. It is realized on all sides that the diet is of pre-eminent importance and constitutes the factor upon which chief, if not sole, reliance must be placed. It has been found that with the establishment of a suitable dietary, all other measures can usually be dispensed with. Sprue patients are notably intolerant of drugs and react unfavorably, especially to iron and arsenical preparations. Different plans of diet have been recommended in the disease, but the underlying principle is the same in all, namely, a liberal amount of nutrition with a minimal burden to the overtaxed digestive functions. An exclusive milk diet is favored by most authorities, especially at the outset of treatment. Carnegie Brown has worked out the following plan, which is found of the greatest value in his cases:

Beginning with sixty ounces of milk per day for the first four days, the quantity is gradually increased to one hundred ounces per day by the end of the first month. Complete rest in bed is enjoined in conjunction with this plan. The advantages of an exclusive milk diet are found to be many. The patient experiences a prompt relief from all distressing symptoms. The abdominal distention soon subsides. The tongue loses its irritative character. The stools are reduced in number along with a corresponding decrease in their fermentative and fetid character.

However, the large quantity of fluid necessary to maintain nutrition in an exclusive milk diet becomes a burden to the already atonic stomach and bowel. It is likewise obvious that the body weight can not be consistently maintained over an extended period without the addition of other food substances. It is doubtful, to my mind, whether the fat content of the whole milk is without harmful effect in view of the grave difficulty experienced by sprue patients in the digestion and absorption of fat products. It is not surprising, therefore, to find that the milk cure

as an exclusive plan of diet has met with opposition in some quarters.

In the far East, many varieties of fruit have long since enjoyed high favor in the dieting of sprue patients. Among the different kinds of fruits employed for the purpose, the following are included: strawberries, raspberries, cranberries, grapes, oranges, bananas and the bael fruit, a species indigenous to the tropical countries of the East. In marked contrast with other forms of diarrhea, fruit undoubtedly exerts a beneficial influence in sprue, and tends to decrease rather than increase the number of stools.

Still another exclusive plan of diet employed in sprue remains to be mentioned: the so-called "meat cure" of Cantlie. Cantlie's method includes the restriction of the diet to one and one-half pounds of beef per day, taken at regular intervals, and he and his followers have claimed that prompt amelioration of all symptoms follows the introduction of this plan. However, when other articles of food are denied entirely, meat soon palls upon the appetite and within a week's time the patient will demand the addition of other foodstuffs.

It is at once evident from this brief review of the various dietetic measures employed in the disease that complete unanimity of opinion is lacking. The one fact that has seemed to me to stand out with greatest prominence in contemplating these various diets is that fat is the one element of food not tolerated in sprue. In three cases followed by me recently I convinced myself that fat in any form immediately gave rise to disturbances of the intestinal function, followed by an outbreak of toxic symptoms. A liberal mixed diet, including skim milk, buttermilk, fat-free meat and vegetables and fruits of several varieties yields the most satisfactory results in the dietetic management of the disease. Exclusive diets may be attempted for short periods at the outset of treatment, but within a period of ten days at most should be supplanted by a more wholesome, mixed regime. All breads and cakes in which yeast is used should be interdicted since the presence of yeast cells in the intestinal tract tends to increase the fermentation of the carbohydrate elements. It is also not unlikely that reinfection may occur constantly from the ingestion of breads containing the Monilia psilosis. If the patient insists upon bread as an article of diet, this should be thoroughly toasted.

Based upon the theory that the disease is of blastomycotic origin, due to specific infection with Monilia psilosis, efforts have been made in recent times, particularly by Ashford and his followers in Porto Rico, to prepare a vaccine for use in the treatment of the disease. The vaccine is prepared in the following manner:

Inoculations are first made on Sabouraud's medium and incubated for four days at 37° C. An emulsion is then prepared of the four-day culture, using 10 c. c. of distilled water for dilution. This is shaken in a machine for two hours. It is heated up to 37° C. and is then employed for five days, when autolyzation will usually be found to have taken place. Phenol to make one-half of 1 per cent solution is finally added and the vaccine is sterilized at 56° C. for two hours.

Sixty-two cases in all were treated by Michel by a vaccine prepared in this manner, and of these it is claimed that 49 were discharged cured, twelve were improved and only one died. From these figures it will be seen that the vaccine treatment holds out a promising field of therapy for the future. However, it has been stressed by Ashford, Michel and others that in conjunction with the vaccine treatment the usual dietetic regulations must be observed in order to obtain the best results.

THE DIFFERENTIAL DIAGNOSIS OF HEMATEMESIS WITH REPORT OF A CASE*

By Whitman Rowland, Jr., B.S., M.D.,
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It has been said that the measure of value of a medical thesis is in direct proportion to its contribution to scientific knowledge. This is, indeed, a half truth. There is evidence, however, that something is needed to stimulate the busy practitioner to a fuller appreciation of the value of detail.

*Read in Section on Medicine, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

To weather the storm of capable competition, the internist of today is compelled to devote time and attention to the detail and accuracy of laboratory work and physical examination. The intensely human attributes of casualness and indifference are manifested in the incomplete history, and in a superficial attitude toward a thorough analysis of the patient's symptoms.

Dr. Arthur F. Byfield has said, in speaking of case history taking:

"The importance of this phase of the diagnostic routine can surely not be overemphasized. As we have so often stated, a ragged anamnesis may lead the diagnosis into an absolutely wrong channel, while, on the contrary, a complete, well-rounded, well-analyzed case history may practically establish the diagnosis."

Perhaps no other symptom of constitutional disorder exemplifies more clearly the value of accurate and complete case history than does hematemesis, and certainly hemorrhage as a presenting symptom calls for great care on the part of the internist in his effort at correct differential diagnosis.

The presence of bright red blood, copious in amount, emanating from the oral cavity, does not necessarily mean that the underlying pathology is a pulmonary tuberculous lesion. Subconsciously we associate hemorrhage with tuberculosis, and too frequently we are prone to condemn patients showing this symptom to the disturbing belief that they are definitely and unmistakably tuberculous, without even an attempt to elicit a careful history, and with only a casual superficial chest examination.

The internist confronted with this symptom is at the same time confronted with the grave duty of establishing, in so far as is possible, a definite underlying cause for the condition. Of first and of most prime importance is the ruling out of pulmonary tuberculosis. It follows, then, that an effort should be made to establish the seat of origin of the hemorrhage.

I shall not take up your time with a lengthy discussion of the etiology of hematemesis, but shall simply enumerate some of the most frequent causes.

The symptom may result from conditions both local and general. Under local is included: (1) cancer, (2) ulcer, (3) miliary aneurisms and varicosities, (4) acute congestion, as in gastritis and sometimes following abdominal operations.

Under general conditions we have the large group, due to obstruction of the portal circulation, either by tumor, cirrhosis of the liver or thrombosis of the portal vein. There follows a miscellaneous group under which may be included those toxic cases, the result of the specific fevers, as, for example, smallpox, measles, yellow fever, etc. Rarely the symptom is caused by injuries, such as blows, wounds and occasionally by the use of the stomach tube. It has also occurred in certain constitutional disorders, particularly hemophilia and pernicious anemia, and not uncommonly it has occurred idiopathically. Hemorrhage occurs most frequently in our medical practice in connection with cirrhosis of the liver and ulcer of the stomach.

I have chosen the following case for presentation because of its apparent simplicity and because of its almost typical text book symptomatology:

Anamnesis.—Mr. H. P., white, a farmer, age 24; chief complaint was "weakness and indigestion."

The family history was unimportant.

P. H.—He had had the usual diseases of childhood. Up until the age of 17 or 18 he considered himself a normal, strong, healthy boy. There was no history of typhoid, scarlet fever, malaria or rheumatism. While in the Army he had an attack of pneumonia from which he made a complete recovery, without complications in so far as he knows. About the age of nineteen he began to suffer occasional attacks of indigestion. These attacks came at rather wide intervals, lasted for only a few days, finally passed off and gave no further trouble. There was an interval of about two years in which he was apparently in good health. He stated that about 1916 the attacks of indigestion returned and came at more frequent intervals. These attacks lasted longer and were accompanied by pain in the epigastric region, acid eructation, and on one or two occasions he vomited. There seemed to be no definite relation of pain to the taking of food at this time. Some time later in the same year, during one of these attacks of indigestion he summoned a physician who made a diagnosis of appendicitis and the appendix was removed. Following the operation there was a short period during which time he was fairly comfortable, though never free from an uneasy sensation in the pit of his stomach.

In 1918 he enlisted in the Army; passed a good physical examination, but after a short period of activity was discharged as unfit for military service. No information was given him in regard to his trouble. He returned from the Army very much underweight, and very weak. At home he began to improve, felt stronger and gained in

weight, though all the time he suffered from uneasy sensations in the pit of his stomach.

H. N.—He had never suffered from morning or chronic headaches. There has been no disturbance of vision, no conjunctivitis or discharge from the ear. On occasions he had suffered from attacks of dizziness. His throat had never given him any trouble and he has never spit up any blood, but on one occasion vomited a large quantity. There was no history of chronic cough or blood-tinged sputum. Up until the present illness he never suffered from shortness of breath, but since the present illness began this has given him considerable trouble. There is no history of precordial pain, palpitation or night sweats.

G. I.—Since the age of eighteen he had suffered at intervals with attacks of indigestion. For the past three years he had more or less continuously suffered with pain in the epigastric region. The pain was of a gnawing character, but never showed any tendency to radiate. Recently he had suffered from very distressing heartburn and acid eructation. Since the present illness began all food seemed to disagree with him and nausea and vomiting were frequent. There had been occasions when he thought his stools were rather black in appearance. One year ago he vomited a large quantity of blood and fainted.

G.-U.—There was no history of discharge nor primary sore, and in so far as he knew he had never had any breaking out on the body.

Habits.—He slept on an average of eight hours per night and previous to the present illness ate three good meals per day. He smoked on an average of about twenty cigarettes each day, drank coffee night and morning and took an occasional drink of alcohol.

P. I.—The present illness began one year previously with suden severe hemorrhage. Since that time he had been troubled with attacks of nausea and vomiting and pain in the epigastric region. The pain was deep seated, of a dull, aching or burning, gnawing character, and apparently came on about one hour after eating. It seemed to remain localized in the epigastric region and frequently was accompanied by nausea and vomiting. The vomitus was sour, rather grayish in appearance and very tenacious. On no occasion had he ever noticed any blood streaks. In the interval between those attacks he suffered from acid eructation and distressing heartburn. For the previous two months he had suffered severely from constipation, and he had had to depend largely upon drugs. On one or two occasions he had noticed that his stools were rather black in appearance. The nausea, vomiting and pain were the chief factors which caused him uneasiness and disturbance at that time. Upon direct questioning he admitted that food sometimes seemed to relieve the pain.

He stated that he was about twenty pounds underweight at present, felt weak all the time, and had neither the energy nor strength for work.

P. E.—A markedly undernourished young man apparently twenty-five or thirty years of age. His expression was anxious, the eyes sunken and his conversation frequently interrupted by gaseous eructation and expectoration.

The skin was smooth and moist. There was an operative scar in the appendix region. Pupils regular, of equal size, and responded both to light and accommodation. Nose and throat are negative, except for slightly enlarged tonsils.

Heart.—Apex beat 5th interspace, 3 inches from mid-line. Rhythm regular; rate 84. No murmurs nor thrills.

Chest symmetrical, of equal expansion on the two sides. Careful and repeated examinations failed to demonstrate any physical signs.

Abdomen was rather flat; regular in contour. Definite localized pain to deep pressure in the epigastric region. Liver and spleen not palpable. No rigidity, no abnormal peristalsis, no fluid, no masses.

The posterior cervical glands palpable, but there was apparently no other glandular enlargement.

Reflexes.—Normal patellar; no Babinski; no ankle clonus.

Temperature 98.6; respiration, 20; pulse, 84; blood pressure, systolic 120, and diastolic 70.

Laboratory Analysis.—Gastric analysis following an Ewald test meal showed a small quantity of thick glairy, tenacious mucoid material withdrawn with much difficulty. No occult blood. Free HCl, 64; combined, 62; total acidity, 104. No organic acids. Stomach after inflation was apparently normal in size.

The urine was of a pale amber color, sp. gr. 1020; acid; no sugar, no pus, blood or casts.

Stool—No occult blood. Negative for ova. Benzidene and Guaiac tests positive.

Differential:

Polys, 68 per cent.
Small Monos., 22 per cent.
Large Monos., 5 per cent.
Trans., 3 per cent.
Eosins., 2 per cent.
Mast., 0.
Wassermann, negative.
Hemoglobin, 70.
R. B. C., 3,500,000.
W. B. C., 7,000.

Sputum, negative.

In arriving at a diagnosis the important facts of the history were grouped as follows:

The long-standing complaint of indigestion. Under gastrointestinal symptomatology, the history of epigastric pain and periodicity of attacks. It was deemed significant that at present the pain came on about one hour after meals. There was history of epigastric pain relieved by the taking of food, passage of tarry stools, acid eructation. The definite history of constipation was noted. In reviewing the history it was further noticed that there were intervals when he was apparently well and healthy, gained in weight, and suffered only slight inconvenience. It would seem further significant that other regional history, e. g., respiratory, genito-urinary, etc., was apparently negative.

The history of heartburn, acid eructation, nausea and vomiting grouped with the above symptoms would seem to indicate the alimentary tract as the seat of the pathological lesion.

It then remained to establish the seat of origin of the hemorrhage. The only positive finding on physical examination was the localized area of tenderness over the epigastric region. The fol-

lowing possibilities were considered: pulmonary tuberculosis, leutic infection, gall-bladder disease, cirrhosis of the liver, tuberculous peritonitis, portal obstruction due to tumor, peptic ulcer, gastric or duodenal, and carcinoma of the stomach.

Pulmonary tuberculosis was ruled out by the absence of history of night sweats or hemoptysis. A three-hourly temperature record over a period of one week showed a normal diurnal variation. Careful and repeated chest examinations failed to demonstrate any physical signs.

The normal pupilary reflex, negative Wassermann and normal knee jerk discounted the possibility of lues.

It was hardly possible that tuberculous peritonitis could have been present without the evidence of free fluid or the tenderness, spasticity and localized masses which we depend upon for diagnosis when fluid is absent.

Gall-bladder disease, cholelithiasis or cholecystitis existing over so long a period would have certainly shown some characteristic symptom, e. g., acute colicky pain, slight icterus, etc. And from the history it will be seen that the weight of evidence was against gall-bladder disease.

It was noted that the hemorrhage might have had its seat of origin in varicosities at the lower end of the esophagus as a result of portal obstruction, either by cirrhosis or tumor formation.

The absence of ascites, normal size of liver and spleen, absence of enlarged epigastric or mammary veins and failure to elicit any history of cerebral symptoms tended to rule out hepatic cirrhosis, and it was not possible to demonstrate the presence of tumor.

Carcinoma could not definitely be ruled out, but the age of the patient counted against it; also the presence of hyperacidity suggested the absence of malignant neoplasm.

There remained then for consideration gastric or duodenal ulcer. All of the classical symptoms and signs descriptive of peptic ulcer were practically without a single exception unmistakably present. Therefore, without the slightest bit of hesitancy, a diagnosis of peptic ulcer was made.

Additional evidence was added by a series of roentgenographs, which showed a marked hypomotility of the stomach, the forty-eight hour film showing a large amount of the barium meal still remaining in the stomach.

It is hardly conceivable that errors of diagnosis could have been made in this case. Yet, it is interesting to note the following:

Previous Diagnoses:

1. Pulmonary tuberculosis.
2. Appendicitis.
3. Acute indigestion.
4. Chronic indigestion.

These errors, I am convinced, can not be traced to lack of knowledge, but rather to a superficial indifferent attitude manifested in a failure to take a complete history and a casual analysis of the patient's symptoms.

This young man for over twelve months suffered the worry of uncertainty through the belief that his condition was hopelessly tubercular and, in my opinion, the operation for appendicitis two years ago was needless. I believe that at that time he was a victim of peptic ulcer.

DISCUSSION

Dr. E. C. Thrash, Atlanta, Ga.—I agree with the essayist that there is no disease where the history is so important, probably, as in gastric ulcer. There is no disease where the history points so directly to the locality of the disturbance.

I do not consider hemorrhage of the stomach difficult to diagnose. There may be some difficulty in arriving at a conclusion as to why there has been a hemorrhage from the stomach. I have never seen but one case of hemorrhage from the stomach where I was not absolutly sure of the source. This was a case of purpura hemorrhagica where bleeding areas were manifesting themselves generally over the body, and it was problematical. I was uncertain whether or not there were pulmonary hemorrhages, but I was sure there was some bleeding coming from the stomach.

One of the causes of hemorrhage from the stomach not mentioned by the essayist is purpura. There is no need for one to hesitate except in the rarest of instances. You have the symptoms and signs that are apparent. The leading dominant one is the vomiting of blood. Another is, you have pulmonary symptoms from pulmonary hemorrhages, and you have gastric symptoms from gastric hemorrhages that are classic.

One thing I want to lay stress upon in connection with hemorrhage is this: Do not tell the patient that he has had a hemorrhage from his throat. Half of the people who come to me with histories of hemorrhage say that the doctor said such a hemorrhage does not amount to anything, since it came from the throat.

You have hemorrhages, either vomited or spat up, coming from heart lesions, pulmonary lesions, visceral lesions of the thorax or stomach, and your pathology may be in the stomach or chest. I have never in a single instance seen a hemorrhage I thought had come from the throat or anywhere near the throat unless there had been an operation or some traumatism. A patient with hemorrhages from the stomach gives a history always of trouble in the past directed to the stomach except in the rarest instances. Hemorrhages from the lungs come like a flash of lightning out of a clear sky. That is important. When a patient comes to you perfectly well and says he has never had a symptom, but all at once spits up three or four mouthfuls of blood, do not say to him that it amounts to nothing. That means in 999 cases out of a thousand there is a pulmonary lesion. A great many of them get well and never have any more symptoms. I can recall a number of people who have had hemorrhage from the lungs who were apparently well

and who never had any symptoms afterwards. Some took treatment and some did not. A person will spit up saliva that is tinged with blood week in and week out, month in and month out, and even year in and year out from a neurosis. Neurotics become obsessed with the idea of ulcer of the stomach or of having some pathology in the stomach when they have acquired a neurosis of sucking blood from the mucosa of the mouth, especially the gums. You should point out to these individuals the importance of a dentist to get their teeth cleaned up and put in proper condition.

I have one patient who is sueing a railroad company for injury to his lung. He continually spits blood by sucking his teeth. Bloody saliva or bloody sputum means but little. You may develop a serious cold or temperature or strain in any way which may cause little streaks of blood to appear. Do not consider that because a person is straining and retching from some severe disturbance of his stomach and brings up a little blood that he is having a hemorrhage. It may be ten or fifteen drops mixed with the saliva and mucus that he brings up. It is blood from the throat due to a breaking of the capillary vessels there and means nothing.

Dr. George M. Miles, Atlanta, Ga.—There is no clinical occurrence that is more important in its consequences than hemorrhage from the stomach. Whenever an individual has a real hemorrhage from the stomach, not simply spitting up a little blood, there is going to be something doing, and such a person is going to call for help and he is going to have help. The frank vomiting of blood means that there is a great deal of bleeding going on in the stomach, where it is very red, or where it is colored black from the action of the gastric contents. It is a mistaken idea on the part of some of those who are well informed that possibly only one-third or one-quarter of the peptic ulcers ever have hemorrhage. We have this hemorrhage which comes from portal congestion or from varices at the lower end of the esophagus. It has been found that an individual may have a violent hemorrhage and never know it.

Dr. Rowland made some good points in regard to the history taking and a careful grouping of the symptoms, and his paper was excellently assembled and splendidly presented; but there are some cases which come to us where we have to do something at once. We have no time to take the anamnesis. I wish to call your attention to one case I had of a man, 40 years of age, who was stopping in a hotel in Atlanta. He did not live in the city. He entered a toilet and while in there he had a feeling of faintness. He lost consciousness and when he was found he had had a terrific hemorrhage from his stomach. He fell down and the blood was spattered up and down the walls. We gave him morphine. We got him to a hospital. We used ice and afterwards found out that the man was in good health, but unfortunately had crooked his elbow too often. This happened seven or eight years ago. He has never taken a drink since and has never had a hemorrhage since. He is a perfect specimen of manhood today.

There are many individuals who have a single hemorrhage, but never another one. Where we have a condition of indigestion, either constant or recurring, the physician ought to realize that we are probably dealing with a gastric or gastroduodenal lesion, and the case Dr. Rowland presented to us so clearly should have been diagnosed, I think, by an intelligent man when the patient presented himself.

Dr. William R. Kirk, Hendersonville, N. C.—There is one point I should like to emphasize and that is this: where hemorrhage follows traumatism, the explanation usually offered for the hemorrhage is that it is due to the traumatism. Very often, however, the underlying cause is a tuberculous process and the traumatism has caused the rupture of some vessel already weakened by tuberculous deposits. Too often I know the tendency is to say to the patient, "There is nothing the matter with your chest; you received a blow and it caused a broken vessel to bleed." The chest can be subjected to a great deal of traumatism without any bleeding provided the lung is not affected by some disease such as tuberculosis. That is the point I want to make clear. We should not dismiss these cases lightly, but should bear in mind the possible pathological condition which may be present at the time of injury.

Dr. Rowland (closing).—I do not agree with Dr. Thrash that it is definitely easy to diagnose every case of hemorrhage from the stomach. The acute case seen and observed by the physician should certainly be diagnosed readily by any man of intelligence. The purpose of my paper as presented was to show the value of complete and accurate case history in these cases. Granted that the diagnosis is easy, the fact remains that this young man believed that he had tuberculosis. He evidently had been told he had it. In so far as taking the anamnesis in acute cases is concerned, of course that is impossible. But when a man comes to you with a history of having had severe hemorrhage one year previously, acquaints you with the fact that he believes he is tuberculous, has even been West at the expense of time and money in the hope of recovery, then it is your duty to establish the seat of origin of that hemorrhage if possible. It is your duty to rule out pulmonary tuberculosis primarily. It is your duty to tell him what he has got and this is not always easy. Even though the diagnosis of hemetamesis is easy, the fact remains that there were erroneous diagnoses made in this case. As I stated, the whole object of my paper was to show the value of a detailed and accurate case history. If, through superficiality you fail to elicit this complete history, you will fall in the same category with the men who failed to make a diagnosis in the first place.

SCARLET FEVER AND THE STREPTOCOCCIC SORE THROAT: AN EPIDEMIOLOGICAL DISCUSSION*

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There is a fairly voluminous bibliography on the etiology of scarlet fever, but rather a sterile one. Possibly the most interesting work has been carried out along experimental lines. Metchnikoff, Vaillard and Louis Martin were unsuccessful in producing the disease among apes. Grunbaum produced a characteristic angina, but without a rash. The most comprehensive and successful experiments were carried out by Landsteiner and Levaditi. Gay makes the statement that Landsteiner proves that

"The injection of scarlet fever strains of streptococcus in apes did not produce scarlet fever, although the blood of scarlet fever cases transmits the disease to these animals."

A careful perusal of Landsteiner's paper does not bear out this statement. His experiments are worthy of more lengthy discussion because of the emphasis occasionally laid upon the value of his work. The following points seem significant:

1. The experiments were too few, only four in number, as Landsteiner himself admits.

2. As far as the writer knows, no further confirmatory experiments have been made either by Landsteiner, or others, since his original investigation in 1911.

3. Chimpanzee No. 2 may have been a case of erysipelas. The rash began and extended from an area in the left belly, where an emulsion of cervical glands from a case of scarlet fever had been injected. Masses of streptococci were also found in the deeper layers of the skin at the site of the injection.

4. Experimental agents were confused. The matter was not as clean cut as Gay's statement would indicate. The animals were all treated with tonsillar exudate painted on the fauces, often repeated, injection of defibrinated blood, emulsion of cervical glands, etc. Many sites of injection developed streptococcus abscesses.

5. The significant flaw in Landsteiner's experiments with the streptococcus alone lay in the fact that his injections were innocuous and therefore comparisons are unfair. Two chimpanzees were treated with streptococcus colonies from one of the other chimpanzees instead of with virulent primal cultures from scarlet fever cases. If Landsteiner had succeeded in producing a streptococcic throat with a streptococcemia that gave a different clinical and pathological picture, his deductions would have been of infinitely greater value.

6. None of his experimental cases was produced by using streptococcus-free material. In fact all his post-mortem reports read startlingly like those of death by severe streptococcus infection.

The preceding discussion leads up to a resume of our present knowledge of the role played by the hemolytic streptococcus in various diseases. Of late years, particularly in the Army, this organism has been exhaustively studied from the epidemiological standpoint. It is well known that many normal throats occasionally harbor the hemolytic streptococcus. Ruediger claims that he found it in small numbers in 59 per cent of the normal throats he studied. In a report published by Opie, Freeman, Blake, Small and Rivers, these investigators stated that they found the organism in one of four or five healthy men at Camp Funston. Its presence in disease has also been well noted. Ruediger found it in great abundance on the tonsils of patients suffering from tonsillitis and scarlet fever—the latter fact, well known for some time, beginning with Loeffler's studies in 1884. Anthony discovered the organism in all twenty-four of a measles series. Levy and Alexander in 77 per cent of their cases. In this connection McCallum states that at Fort Sam Houston very few patients were admitted to the hospital with throats infected with the hemolytic streptococcus, but after admission the infection rapidly took place with often serious results in complications and mortality. In another army report Cumming, Spruitt and Lynch state that in 70 swabs of normal throats only six showed hemolytic streptococci. In 291 throat swabs of

*Read in Section on Pediatrics, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

measles cases 35 were carriers. They hazard the ingenious supposition that the organism paves the way for measles, possibly scarlet fever as well, and then the exanthemata make it possible for the hemolytic streptococcus to play a later and disastrous role. Opie states that there is good evidence to show that the organism disappears from the throats of patients with the onset of measles. It seems fair to state that at present the evidence is overwhelmingly in favor of the complicating part played by the streptococcus in measles. Is the same statement equally true of scarlet fever? Hektoen thinks so after much exhaustive study.

In the army investigations noted by the writer the hemolytic streptococcus has never been found in measles either as early or as frequently as it has been found in scarlet fever. When we dare to consider this organism from the etiological standpoint in scarlet fever one perplexing stumbling block of clinical import is that we know of no strain of streptococcus that will produce the lasting immunity so well manifested in scarlet fever. Of course the important point in the whole matter is that, at the present date, not only the etiology of scarlet fever is shrouded in obscurity, but the streptococcus, though not a proven etiological factor, has not been eliminated altogether from the field.

Early in January, 1919, at U. S. Army General Hospital No. 9, stationed at Lakewood, N. J., in the ward devoted to the care of acute infectious diseases, throat infections began to filter in both from other parts of the Hospital proper and from the medical detachment. Clinically the cases were fairly easily divided into acute follicular tonsillitis and acute nasopharyngitis. The latter condition was characterized by an intense angina without visible exudate. Throats were beefy red and intensely painful. Fever, sometimes quite high, lasted four to ten days. There was a distinct leucocytic rise, usually 15,000 to 25,000. Cultures of these throats, almost without exception, revealed the presence of the hemolytic streptococcus in unusual numbers. For rough clinical differentiation throats were styled one plus, two plus, three plus, or four plus, as the cultures on blood agar showed colonies with 40 to 100 per cent hemolysis. No case was clinically and somewhat arbitrarily styled of hemolytic streptococcus origin unless over 60 per cent of the colonies showed hemolysis. This series was formed, therefore, of cases clinically comparable, where throats showed the organism in abnormal numbers. Out of some one hundred and ten cases studied, 64 were clinically acute follicular tonsillitis and 46 nasopharyngitis, or approximately 58 per cent tonsillar and 42 per cent pharyngeal. In the series described by Winslow and Hubbard 60 per cent showed tonsillar involvement and 83 per cent showed reddening of the throat—a less sharply defined classification. Our border-line cases were classified tonsillar if clinically that condition was the predominating feature.

No well-spring for the infection was discovered. The milk supply was investigated daily. Every dairy that supplied the hospital was inspected. The water supply was satisfactory. Three of the worst and most obstinate cases were found in the kitchen, and it is possible that this small group of carriers formed a nucleus for infection.

Early in February, or about five weeks after the septic throats began to appear, scarlet fever suddenly manifested itself in the hospital. The first case was a cardiac functional who had been in the hospital for some time. There was not a case in Lakewood, either at this time or later. As nearly as we could discover, there was not a case within a radius of a hundred miles of the hospital while the scarlet fever epidemic lasted. All new patients were carefully inspected. No carrier was discovered or recent case noted as a transfer from camps, other hospitals, or debarkation ports. The desultory and haphazard fashion in which the cases developed was a source of much epidemiological confusion. The first case occurred in a medical ward; the second case in the Nurses' Home; the third case in barracks; the fourth case in the most distant of the surgical wards, etc. Between February 16 and April 21 there were 23 cases: two from Ward A, one from Ward A1, three from Ward A2, one from Ward A3, one from Ward C, one from Ward B3, four from Ward B4, two from Barracks 1, three from Barracks 2,

one from Barracks 3, two from Barracks 6, one from kitchen quarters, and one, the only positive contact, from the Nurses' Home. These brief statistics give some idea of the scattered nature of the epidemic. After a curiously vain struggle to limit the spread of the infection, an effort was finally made to discharge patients, less from length of convalescence than from the standpoint of throat rendered free of the streptococcus hemolyticus. This is a difficult matter according to Levy and Alexander, but for some reason was not particularly difficult in this outbreak. Possibly it was through coincidence, for in April open weather was appearing, scarlet fever disappeared at the time this precaution was exercised.

From clinical interest, an effort was made to correlate the hemolytic throat with the scarlet fever epidemic. No startling connection could be established. There were thirty-five hemolytic throats, so-called. Of this number twentysix fell in February, and this throat infection was at its worst when scarlet fever appeared.

Four cases of scarlet fever came from Ward B4, where not a case of hemolytic throat was noted. On the other hand, three cases of scarlet fever came from Barracks 3, where there were eleven septic throats, two of hemolytic origin; three cases came from Ward A2, where there were eleven septic throats, five of hemolytic origin; two cases came from Barracks 6, where there were seventeen septic throats, four of hemolytic origin. Ward A2 stood at the head of the list in the number of septic throats and cases of scarlet fever occurring in the hospital, with the exception of Ward B4. Summing up all data, there was apparently some connection between the location of scarlet fever cases and the location of throats of streptococcic origin.

At this point an obvious criticism could be made, either that our scarlet fever cases were all hemolytic cases with severe rashes, or else we had many unrecognized cases of scarlet fever *sine* rash. Clinically, though the throats of all our scarlet fever cases showed the hemolytic streptococcus in abundance, they were scarlet fever cases beyond question. Rashes were typical, cervical adenitis common, joint involvements and kidney disturbances often manifest, and almost without exception cases peeled with large scales.

In this connection on April 24 one case of great interest was located. Daily my associates, Captain Miner and Captain Curran, inspected the medical detachment. On the day cited a member of the medical detachment was sent to quarantine with a typical scarlatinal eruption. His throat was normal, his temperature 99, and he vigorously claimed perfect health. A tender gland was found in the left thigh and a small pustule from the chafing of a shoe over the left instep. The fluid withdrawn from this pustule grew only colonies of the hemolytic streptococcus. If this patient had had a well-marked angina, with a streptococcic throat and a little more fever, he would indubitably have been classed as a scarlet fever case and placed in quarantine.

In summary the following points seemed most interesting and well worth while noting:

1. An outbreak of fever with rash, clinically typical scarlet fever, occurring at the height of a septic throat epidemic, noticeably of streptococcic origin. It did not begin until septic throats had been seen in abundance for some five weeks.

2. The apparently evident fact that the scarlet fever outbreak originated in the hospital. In spite of careful investigation no outside connection could be established.

3. The widespread and desultory fashion in which the cases of scarlet fever appeared, suggesting strongly the universal presence of some infectious agent. The only agent to be discovered was the streptococcus hemolyticus.

4. Some evident connection between the location of cases of scarlet fever and cases of septic throat of hemolytic origin.

5. The appearance during the epidemic of a mild case of foot infection with streptococcus hemolyticus, accompanied by a fine scarlatinal rash. It is significant that this case, though a very mild one, exhibited a profuse eruption.

6. The apparent subsidence of the scarlet fever outbreak as soon as a systematic effort was made to quarantine septic throats of hemolytic origin.

At this point the writer wishes to emphasize again a statement made elsewhere, that in the opinion of the medical staff these febrile cases with rash were undoubtedly scarlet fever. After closely observing such an outbreak as is described in this paper my colleagues and myself felt that, however obscure a part the streptococcus plays in scarlet fever, the role is certainly a more significant one than that of an accidental invader. Perforce one is attracted by the questions of Welch:

"Is scarlet fever, after all, a local disease appearing in the pharynx and generating an erythemo-genic toxin? Does the streptococcus hemolyticus under certain conditions produce a specific toxin from a limited pharyngeal focus, a toxin which carried in the blood stream, calls forth a definite cutaneous rash?"

In conclusion I wish to acknowledge my indebtedness for much valuable data to my army colleagues, Captain F. B. Miner and Captain S. F. Curran.

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DeRenne Apartments.

SYMPOSIUM ON MALARIA

REPORTING OF MORBIDITY STATISTICS WITH SPECIAL REFERENCE TO MALARIA FEVER*

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There is, perhaps, no more difficult public health problem than the accurate collection of morbidity statistics. It is also equally true that the collection, tabulation and correct analysis of statistical data relative to the occurrence and transmission of the infectious diseases is invaluable in studying the etiology of disease incidence and in instituting such measures as may be necessary in the control and suppression of the communicable diseases. There is, to some extent, a lack of confidence on the part of public health officials, physicians and the public in general with reference to the interpretation placed upon the morbidity reports. It is related that Mark Twain said that there were three kinds of lies—ordinary lies, infernal lies, and statistics. I take it that Mark Twain expressed a semblance of truth so far as the medical profession and the general public is concerned relative to statistical data. Reporting of morbidity statistics, devising a plan which may be used for obtaining such information, and placing the proper valuation on such data are fraught with many difficulties.

Regardless of the method in obtaining morbidity reports, there are certain defects that are inevitable and, therefore, certain errors undeniable, even though the utmost care is used in any plan. In the first place, I think that I am within the bounds of conservatism when I state that at least 25 per cent of the diagnoses made by physicians of infectious diseases are incorrect. As a result the cause assigned for the illness is likewise inaccurate. However, this error would not be uniform in the diagnosis of different diseases. For instance, the diagnosis of the exanthematous diseases is much easier than of the infectious diseases of a more gradual onset. The diagnosis of scarlet fever would be more usually correct than that of malaria or hookworm disease, although there is no justification for a physician making an incorrect diagnosis of either of the latter diseases usually. In other words, the diagnosis of the so-called acute infectious diseases would be more reliable than those that have longer periods of incubation.

Then, too, in placing a correct interpretation on statistical data relative to a particular disease, it should not be overlooked that scores of these infectious diseases in any county or area would not come under the supervision of a physician for treatment. Many sick people use some remedy recommended by a well-meaning though injudicious friend, or follow the advice of some glaring patent medicine advertisement, or obtain information with reference to treatment from a druggist, or last, but not least, simply take chances believing that in time Nature will effect a recovery. It is safe to say that a large percentage of sickness from infectious diseases would come under one of these headings and, therefore, be another source of error in collecting morbidity statistics.

Then, there is the ambulatory group suffering from the more or less chronic infections, who may confer with one doctor and then another and possibly a number of doctors during the period of a year. Each of these physicians may make a report relative to a case of a particular disease so that the same individual may be reported two or three times even during a month. It is a well known fact that there are many ambulatory cases of tuberculosis, syphilis, malaria, cancer and other diseases that may assume a chronic form.

It is hardly to be supposed that all physicians will manifest integrity of purpose in making morbidity reports. There are certain elements of human nature more or less dominant in physicians. When a request is made that a physician make a report on all infectious diseases occurring in his practice to the local health office,

*Read before the National Malaria Committee (Conference on Malaria), meeting conjointly with the Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

there is a disposition on the part of certain physicians, a relatively small number, to make infrequent reports if it be an acute infection or if it be a disease requiring only a monthly summary report to exaggerate the number of cases on the other hand. With the existing system of making reports on contagious diseases there is no way of checking up a physician relative to his practice. It is left wholly to his interest and integrity of purpose. There is no question but there is considerable variation among physicians in this respect and it is a source of error in making reports that is indeed difficult to eliminate. Therefore, any plan or method used in making morbidity reports must take into consideration these factors of error and the question naturally arises, is it possible to obtain sufficiently reliable reports by any plan?

When it is realized that physicians will never be absolutely accurate in the diagnosis of infectious diseases; that there are always certain persons who will never consult physicians for treatment; that there will always be a certain number of ambulatory cases of disease; that there will be inherent differences among physicians in reporting infectious diseases, it is to be conceded that an absolutely correct morbidity report is not to be expected even though one or more of these sources of error be entirely eliminated. It is true that sources of error will be diminished with the enlargement and increased efficiency of state and local health departments, the improvement of diagnostic methods of physicians, and the enlightenment of the public, but even after this is accomplished reasonably well, there will always be a percentage of error. These facts, in the main, account for the general tendency to discredit morbidity reports and serve to create in the average mind certain fallacies relative to information based on reports of the occurrence of the infectious diseases. This, however, should not preclude the necessity of obtaining morbidity statistics and placing upon them the correct estimate of value in preventing and controlling the communicable diseases. There is undoubtedly a very definite and unquestioned value attached to such statistics and this is enhanced, provided they are recorded over *several years*. In making an analysis of morbidity data, assuming that the same machinery has been used in obtaining it, any errors that may exist will be uniform and therefore the conclusions drawn would be reliable for all practical purposes. The making of these reports, then, resolves itself into formulating the most practical plan which will admit of the best approximate results in attempting to achieve accuracy and thoroughness in securing this information.

Incidentally, the reporting of morbidity statistics will not locate the sources of transmission of infectious diseases as a result of "carrier" cases. We know that from 15 to 25 per cent of all people who have active malaria during the mosquito season remain as "carriers" through the winter months and serve as foci of infection with the appearance of mosquitoes the following spring and early summer. Then there is a certain percentage, though a smaller number of individuals, who are "carrier" cases and who do not develop symptomatic conditions, but nevertheless transmit infection as soon as mosquitoes appear in the spring. These facts indicate certain limitations in interpreting statistics of malaria in an effort to use this information in the prevention and control of this disease. The same is true with reference to hookworm disease and possibly to a less degree of other infectious diseases. The point which I wish to emphasize is that there are certain limitations in the use of morbidity statistics relative to certain diseases in obtaining the main objective, namely, the prevention and control of the disease.

In developing any plan for making morbidity reports, it is desirable to keep certain facts clearly in mind. In the first place, the location of a disease and the instituting of measures for its prevention and control should be the chief objective in any plan. The location of foci of infection and the circumscribing and eliminating of them is also fundamental. Then, too, the recording of infectious diseases according to age, sex, color, race, nationality, climate, season, occupation and locality is of importance in the study of morbidity data with a view of obtaining desirable information in the control and suppression of these diseases. Without hav-

ing reports of the infectious diseases, it would be impossible to study and investigate intelligently the occurrence of rare diseases and their modes of transmission. The study of disease incidence is also of value with reference to epidemics and pandemics. It may be advisable to sacrifice one or more of these points at the outset to obtain the main objective, the ultimate use of a plan which is regarded as more or less ideal.

Within the last year the U. S. Public Health Service, through its division of epidemiology, has offered to co-operate with a limited number of states with a view of carrying out what may be termed the "model plan" in the reporting of morbidity statistics. In order to effect this result, the state health officer is made collaborating epidemiologist, with assistants, if necessary, and each local health officer is also appointed an assistant collaborating epidemiologist. This makes it possible for those officials and the physicians to use the franking privilege in making reports to the local health officers. The plan requires the reporting of all infectious diseases on clinical cards provided for this purpose, giving such data as is deemed advisable pertaining to each disease. These reports are to be made by the physicians to the local health officer within twenty-four hours after the diagnosis is made. Then, at the end of each week, summary clinical cards are mailed to the state health officer for tabulation and permanent record. In turn, the state health officer makes a monthly report on these diseases to the Surgeon-General of the U. S. Public Health Service. This plan contemplates meeting all of the requirements and working out the best possible system for obtaining morbidity reports. However, owing to the variation of organization in the local health departments, and therefore the difference in efficiency depending on whether they are in charge of part-time or whole-time men, this plan is confronted with what appears in some instances almost insurmountable difficulties. If every county in the state had a department of health, with an all-time director in charge, there would be less question about the ultimate success in using the model plan. But in view of the lack of organization, the question naturally arises, is it desirable to obtain these reports in a somewhat modified way at the outset, having as the ultimate objective the model plan?

Just in this connection I trust you will pardon me for referring to the method used in Mississippi during the past eight years. During the latter part of 1913, the director of the Bureau of Vital Statistics, under whose direction these reports were made, conceived the idea of requiring the county health officer, all part-time men at that time, to make summary morbidity reports at the end of each month on special forms based on monthly summary reports from the individual physicians in the county on the infectious diseases which they had in their practice during the month. While we were fully conscious of the defects in the method used and the results achieved, still it was considered a decided step forward. There were two facts in mind in inaugurating the plan: (1) to secure the co-operation of all the physicians in making morbidity reports, and (2) to obtain information which would be of definite value when considered over a period of years, and, also, of limited value in the actual control and prevention of diseases at the time the report was made. In order to obtain results in effecting this system, a monthly report was sent to each county health officer graded on the percentage of physicians reporting to him that month in the county. In this way, the counties were graded A, B, C, D, and E. The county health officer who secured a report from 90 per cent or more of the physicians in the county was classed as grade A; those obtaining a report from 80 to 90 per cent graded B, and so forth. It appeared very soon that this caused a very wholesome rivalry between the county health officers and physicians of the state. The work of the county health officers was followed up by correspondence and otherwise and the physicians who did not report were investigated, so that with each successive month the results improved in quality from every point of view. To secure better results in backward counties, the judge of the court was requested by certain county health officers to charge the grand jury with

the responsibility of investigating the physicians of the county relative to making morbidity reports. This had a most wholesome effect. It is gratifying to state that we are now obtaining reports from about 95 per cent of the physicians of the state each month.

During recent years we have required the physicians to report acute infectious diseases, under Section IV of Morbidity Regulations, directly to the State Health Officer on a clinical card. This is done, primarily, for the purpose of controlling the spread of these diseases. Within the

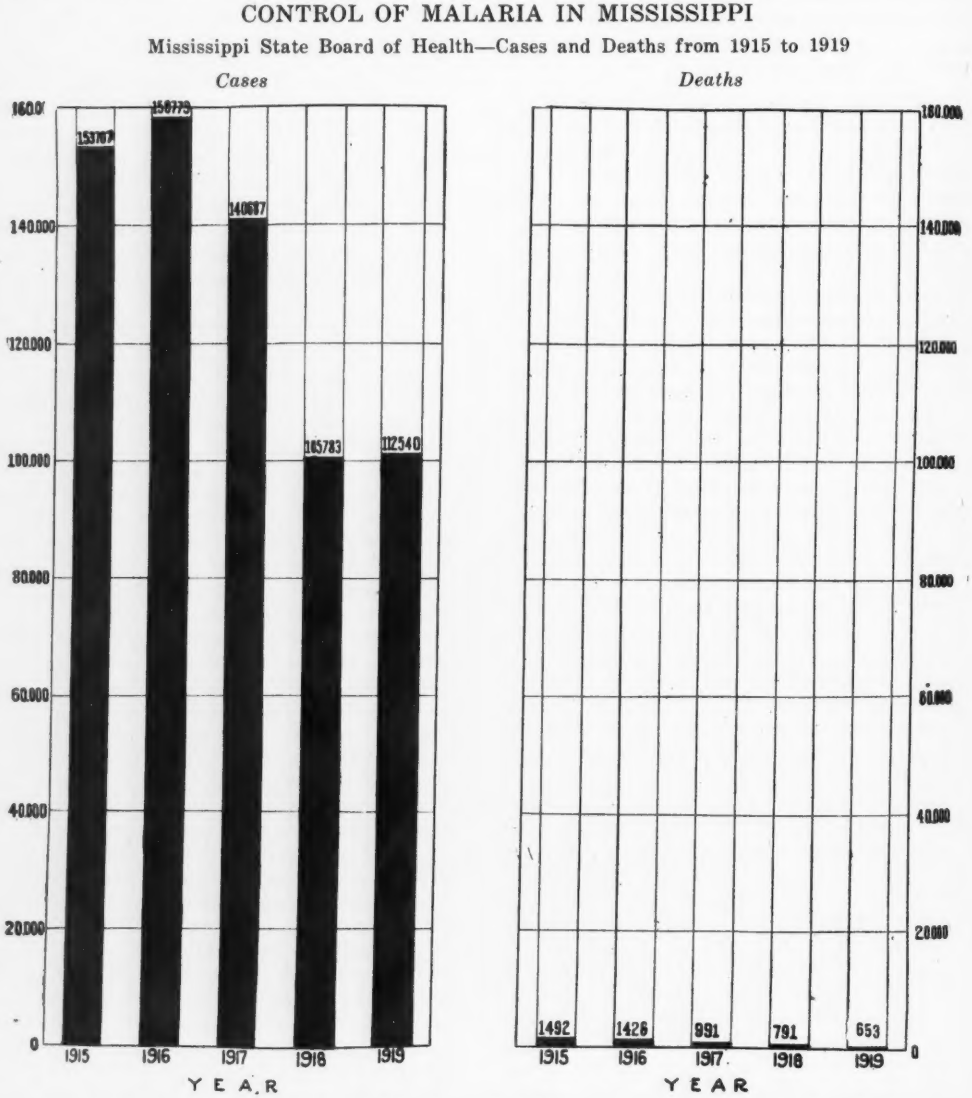


Fig. 1.—The above graph shows the cases and deaths from malaria during the years 1915 to 1919. There has been a definite decrease in malaria in Mississippi and this is evidenced by the fact that each year from 1915 through 1919 the deaths have decreased from 1492 in 1915 to 653 in 1919.

last year the health officers, in as many as 41 counties, have been made assistant collaborating epidemiologists and we are now trying to develop the model plan as above detailed for the purpose of reporting the acute infectious diseases to the local health officer as soon as the diagnosis is made. However, we also require of these health officers a summary report from physicians at the end of the

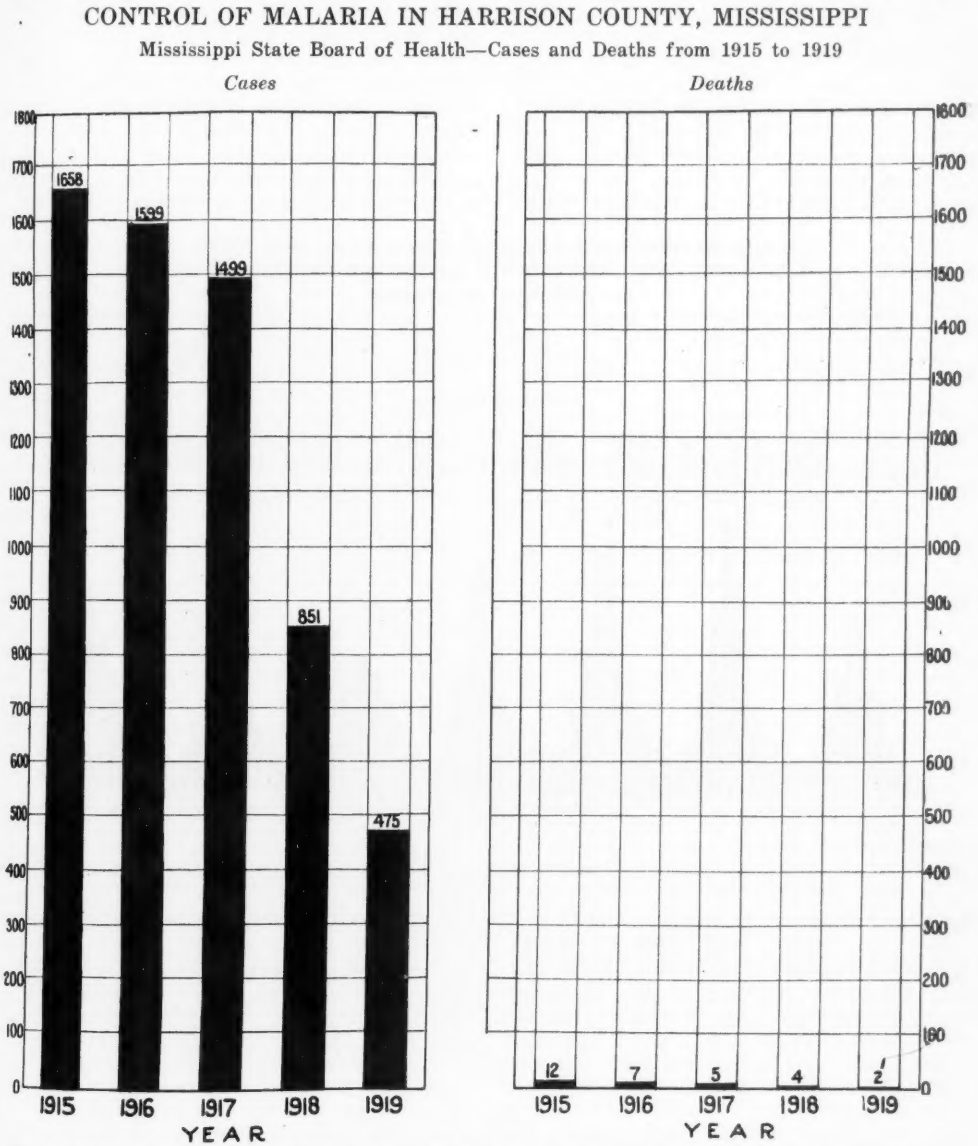


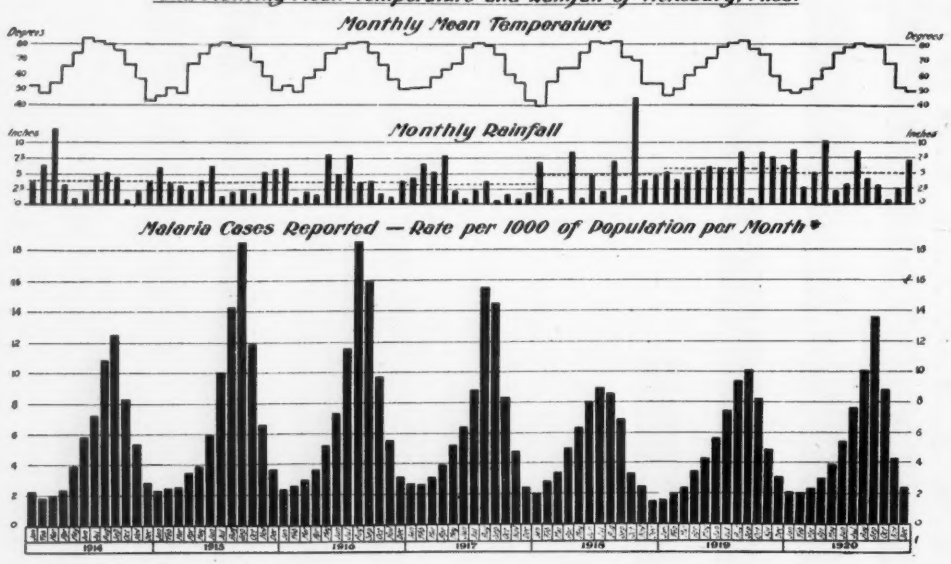
Fig. 2.—Public health activities in Harrison County, Mississippi, have been carried on during the past several years especially for the control of malaria. The above graph, showing cases and deaths during the successive years from 1915 to 1919, indicates a decided reduction in both cases and deaths from malaria.

month, as heretofore, and we then use the summary reports as a control test for increasing the efficiency in reporting the acute infectious diseases on special clinical cards.

There are, doubtless, those who question the use of any method of making morbidity reports except upon the model plan, and think that it should be used at the very outset. But we must realize that it takes time to develop this work; that it is only very recently that any definite plan has been proposed; and that there has been much indifference on the part of the medical profession, in general and in particular, in making any kind of report. While we recognize the defects in the morbidity reports obtained in our State, we are also confident that the plan used has been productive of great good in establishing an *esprit de corps* among the physicians, and the information obtained has been most helpful in convincing the public that the State Health Department has achieved definite results in its methods of work. This is well illustrated by the graphs.

In beginning any plan the question arises, is it desirable to make reports of all infectious diseases within twenty-four hours after the diagnosis is made, or is it better only to report the acute infectious diseases within twenty-four hours to the local health officer and those of a more insidious and gradual onset at the end of each month? As we see it, the main objection in having a report made of two different groups of diseases at different times is the possible confusion which may occur among the physicians. It may also be contended that there is increased efficiency in the simplicity and uniformity of the plan used. As the reports are to be made on clinical cards giving certain data of all diseases, it would seem desirable that these reports be made promptly, regardless of the character of the disease. This would unquestionably render the information more reliable and useful. However, it may be advisable in achieving the ideal plan as above described to use a modification of it during the initial stage.

The making of morbidity reports with special reference to malaria implies that



*Standardized for a month of 30 days.

Fig. 3.—Credit is accorded Dr. Frederick L. Hoffman, Statistician of the Prudential Insurance Company, for the above graph, using Mississippi data on malaria by months, indicating the mean temperature and monthly rainfall.

there is a question whether a disease like malaria should be reported by the physicians, and, if reported, should it be made on a clinical card within twenty-four hours after the diagnosis is made or on clinical cards at the end of the month giving certain data about each case, or in summary form without giving information relative to each case?

If we are to prevent and control malaria and deal with this great problem on a scientific basis, it is certainly necessary to have reports made on cases of malaria. Since the reporting of malaria within twenty-four hours after diagnosis is made would be of but little value, so far as instituting immediate measures for the control of malaria fever, it would seem advisable to make reports of this and similar diseases at the end of the month. These reports would be used chiefly to direct intelligently the methods employed for the prevention and control of such a disease over a long period of time. And, therefore, in order to deal with the medical profession in the most reasonable way, to obtain their interest and co-operation, it would doubtless be best to require the physicians to make these reports at the end of each month, either on clinical cards or in summary form. The report should be made, but there is a question as to whether it should be on summary form or clinical cards. Therefore, the course which is least burdensome to physicians is the best to follow relative to malaria and allied diseases at this stage in the development of health organizations.

In Mississippi, during the past eight years, reports have been obtained from more than 90 per cent of the physicians of the State on malaria in summary form each month. It is of interest to note that the deaths from malaria which have been reported on the regulation death certificate on the basis of the model plan have been decreased each year, and this fact confirms and reinforces the result obtained in the morbidity reports. In other words, there has been a decrease in the morbidity and mortality of malaria in Mississippi as shown by these reports in the last seven years.

Regardless of the scientific value which may be attached to the morbidity reports in our own State, they have been of decided value in creating confidence on the part of the public in the State Health Department, and we also believe that they are of considerable importance in the study and control of malaria and other diseases.

In conclusion, I wish to emphasize the great need of having the U. S. Public Health Service institute a plan for the reporting of morbidity statistics in co-operation with the respective states to establish a registration area for morbidity. This has been done by the Bureau of Census with reference to births and deaths. The reporting of morbidity statistics is such a difficult problem and involves so many relations to the public and medical profession that the model plan will never be successful until the Federal Government presents a plan to a state and begins to establish registration areas based on proper execution of that plan. The fact that these reports are not being obtained, generally speaking, upon the right kind of basis and as successfully as their importance demands, will of necessity cause a weak link in the methods used in the prevention and control of the infectious diseases. We all recognize that the most important thing is to obtain the information relative to where a disease is at its beginning in order to prevent its spread. It is better to put out the spark before it becomes a fire.

DISCUSSION

Dr. S. W. Welch, State Health Officer, Montgomery, Ala.—The importance of obtaining these reports in any form can not be challenged. It is better to get reports, as we have endeavored to do in Alabama, in any manner whatsoever and from anybody rather than not to get them at all. We should like to have them in proper form, and we should like to have them designate the age, sex and race of the individual affected. But if we can't get them that way, we will take them merely by names, of the numbers that have occurred in the practice of the physician.

There are some diseases which should be reported immediately. We have a Bureau of Infectious Diseases in Alabama that started out about a year ago under very unfavorable circumstances. We had not endorsed the plan adopted in some states of making a drive on certain diseases. You may take malaria, for instance, exclude reports of all other diseases, and make an effort to get complete reports on malaria. The Bureau of Venereal Disease Control at Washington made an effort to have Alabama make a drive on venereal diseases. This we objected to.

We believed that unless we educated the doctors to report all infectious diseases, an effort to get accurate reports on a certain disease would, when the pressure was relieved, do us more harm than good. The results obtained in other places has demonstrated the accuracy of that conclusion.

We made an effort to get immediate reports on all diseases in cases like diphtheria which required immediate control. We requested the doctors to report by wire so that the quarantine officers or the county health officer, whichever might obtain in the county in which the disease occurred, might take cognizance of it and immediately isolate it. But in cases like typhoid fever or malaria, where the necessity for immediate action was not quite so great, we expected reports at the end of the month.

The uniform plan of reporting suggested by the U. S. Public Health Service has ben adopted in Alabama. The reports coming into the Bureau of Epidemiology have shown a very steady growth since October a year ago. Every month has shown an increase in the number of doctors reporting and in the number of cases reported, and we are indulging the hope that by the time we get our counties organized, or at least the major portion of them, we shall have fairly good morbidity reports.

Mr. A. W. Fuchs, Associate Sanitary Engineer, U. S. Public Health Service, Memphis, Tenn.—While most states make the reporting of communicable diseases obligatory, many fail to include malaria among reportable diseases. That is the case in North Carolina, where I did some malaria work during the past few years. The details of the methods used for collecting state-wide reports on malaria and the determination of the advantages of one method over another are important, but not so important as the fact that the reports are collected. A meeting like this is the proper place to urge upon all state health officers the necessity of making the reporting of malaria obligatory by law. On account of the entire absence of malaria reports in many states, various schemes have to be resorted to, to get an idea of the prevalence of malaria. I have used a number of methods which I wish to suggest to those people working in states where the reporting of malaria is not made obligatory.

One which has been used quite frequently is to visit the doctors in the community and get from them the number of cases of malaria treated by them during a given period. Most practicing physicians do not keep case records, but will often be able to recall, by glancing through their day book or account books, the patients treated for malaria.

Of course, it is difficult to get the doctors to go to this trouble, but I have found in the towns that I have worked that at least 70 per cent of the doctors are willing to give you reports if you keep after them. You may not succeed on the first visit, and perhaps not on the second, but if you keep after them long enough you will finally get something.

Another method frequently employed is to obtain a history index by a house-to-house canvass of the community or a portion of it. From this the percentage of the population infected may be calculated. Results of a history index are generally higher than the figures obtained from doctors, as many cases never consult a physician. On the other hand, such an index is often too low on account of the unwillingness of persons interviewed to give the information.

I have been able to obtain a fairly comprehensive idea of the malaria situation in a community by examining doctors' prescriptions on file in local drug stores. Some idea of the prevalence of this disease may also be obtained by requesting the parents of children who have been absent from school to state whether the absence was due to malaria.

Health and industrial insurance companies' records of claims paid for malaria by those companies are of considerable value where available. I have obtained such data for several towns in North Carolina. The difficulty about these figures is that they will not by any means give you all the malaria cases that exist in the town in question. But if the purpose of your investigation is to obtain a comparative idea of the prevalence of malaria from year to year, especially as the result of an anti-amalaria campaign, it has been my experience, where state morbidity reports are not available, that reports by health insurance companies are about as reliable a method of determining the decrease or increase in malaria as any method known.

Dr. John Thames, City Health Officer, Little Rock, Ark.—I do not want this opportunity to pass without referring to one part of Dr. Leathers' paper, and that is a summary monthly report.

It was my privilege in 1912, in Wilmington and New Hanover Counties, North Carolina, to assist in establishing a health department, in advance of the State department, in regard to morbidity reports. The plan adopted was to have the case reported within twenty-four hours and then a monthly summary report of all the cases of the disease by the physicians. This was the plan we adopted in 1912. It worked very well, indeed. It encouraged the doctors and it helped the health department. We health officers have to take care of ourselves. It helped in this way: when the doctor telephoned in the case and then kept it with the case card report it was easy to find the case. The doctor was required or encouraged to make a summary report. If he told us that he had telephoned the case and that he had mailed the card at the end of the month,taking the number of cases reported, we checked up to see whether or not the case had been reported. If it had been, we had it at the end of the month over the doctor's signature again.

The greatest trouble we had was the inability of the physician to verify his diagnosis. When I asked them to take a specimen of blood and make a complete examination before they began the treatment, they told me that the patients very frequently had ben taking a course of quinin for two, three or four days before they went to the physician. It was impossible to get an accurate report of the case. Getting an accurate report is our chief trouble, because treatment is begun before the examination and diagnosis are made.

Mr. George Parker, Sanitary Engineer, International Health Board, Austin, Tex.—There is one point which is suggested by the antimalaria work that I was connected with this year.

According to reports that were available through a local health officer, there was shown a 106 per cent increase in malaria surrounding an area under malaria control. The doctors who reported cases furnished a guide for the work, designating what progress was being made. Statements of the physicians were that 50 per cent of the malaria cases being treated in the controlled area were contracted in the surrounding communities. We have no definite figures of what the malaria rate was in the town without the history connected with each case, but we do know there was a 106 per cent increase in the surrounding territory.

The antimalaria demonstration work that is being carried on is guided by statistics. Without these we can not know what the result of the work is. We find that it is almost impossible for the doctors to check over their books and give an accurate idea of what malaria was treated during previous years, so when a season's work is finished there is no basis for comparison to show the gain that has been made.

If reporting of cases can be instituted where antimalaria work is being conducted, the principal thing is to include in such records a history of each case. It might then be known where the infection is originating, and methods to control that infection could be adopted.

Dr. T. H. D. Griffitts, Surgeon, U. S. Public Health Service, Norfolk, Va.—I at one time had the desk of State Vital Statistician in a leading state. The main benefit of the vital statistics there was to give me some idea of the lack of reporting. That was about all it amounted to.

We have neglected an important means of securing better vital statistics in that we have not stressed the subject more in the medical schools. When one is licensed to practice medicine, surgery and obstetrics, in all their branches, this license should also specifically include and sternly require reporting of communicable diseases in such manner as required by the legally constituted health authorities. Is it not time now to start along this line and to make this a part of the licensing of the state under its police power? In its relation to public welfare, preventive medicine is the most important branch of medical science. Public health efficiency is largely dependent upon dependable vital statistics, and whenever a physician fails to comply with the requirements of vital statistics laws, why should not this affect his privilege of continuing to practice medicine?

Relative to the remarks of Dr. Welch, of Alabama, on the question of reporting immediately malaria as in the case of yellow fever: I believe if this were required, or we attempted to require it, that it would in a measure defeat the purpose that we are aiming at in getting reports of malaria. Let us not lose sight of the fact that malaria and yellow fever are quite different as regards their infectious stages. At the onset a case of malaria is not capable of infecting the mosquito; sufficient time must have elapsed for the development of the gametocytes and for their occurrence in the peripheral circulation. That is usually several days, or even weeks. Not so with yellow fever. The mosquito concerned (*Aedes calopus*) must bite the patient during the first three or four days of the attack in order to become infected. Later than this the patient is not infectious to the mosquito. Hence, the importance of immediate report and protection from the bites of the mosquito in the case of yellow fever. With malaria the chronic case and the carrier are the public health dangers.

I believe that if monthly reports are required for malaria we should come nearer getting the full co-operation of the practicing physician and the results desired than if it is attempted to get reports within twenty-four hours.

Dr. Frederick L. Hoffman, Statistician, The Prudential Insurance Company, Newark, N. J.—As Chairman of the Committee on Statistics of the National Malaria Committee, I have prepared a report representing the work of the year. I shall not read this, but shall place it on file with the hope that the matter may subsequently be printed. The report may be summarized in the statement that the general conclusions are favorable to the work which has been done in the State of Mississippi, suggestive of the direction which similar efforts should take in other states in which malaria is a problem of sufficient importance. The Mississippi plan of disease registration is by far the most successful that has been developed in this or in any other country of which I have knowledge, not only as regards malaria and the infectious diseases, but also as regards certain other cases, particularly pneumonia and cancer.

The Mississippi method of disease registration rests upon reports made by attending physicians direct to the county health officer and the report is then made by the local health officer to the Register of Vital Statistics for monthly tabulation and analysis. The data are available for public consideration within a few weeks after the end of the month, disclosing a true picture of the health conditions of the State. The Mississippi method clearly illustrates the practical value of morbidity statistics as an indispensable aid in the correct interpretation of mortality facts. Unfortunately, the mortality data are much more delayed as regards publication than the morbidity data, so that it is impossible at the present time to deal with the death rates in the manner with which we deal with the sickness rates. Through the courtesy of the Census Office, however, I have been able to bring together the mortality data for the two years 1918-1919, and with your permission I shall briefly comment upon the essential facts for the Delta counties, where malaria for reasons of topography, lack of drainage, etc., is most common.

Combining the 13 Delta counties, it appears that the malaria morbidity increased from 46,509 cases reported during 1918 to 50,956 during 1919. The corresponding morbidity rates per 1,000 of population were 118.4 for 1918 and 122.1 for 1919. As a disease, therefore, malaria was more common during 1919 than during the previous year. In Bolivar County the actual number of malaria cases reported increased from 8,318 in 1918 to 10,370 in 1919. Or, respectively, the rate per 1,000 of population increased from 148.8 to 182.6. This is the highest rate recorded for any county in the Delta. Sunflower County, during 1919, showed an increase in reported cases from 5,675 to 6,932, or, respectively, the

rate changed from 134.8 to 156.7. Malaria during 1918 increased as a disease in Bolivar, Coahoma, Issaquena, Sunflower, Tallahatchie and Washington Counties, while it decreased in Leflore, Holmes, Quitman, Sharkey, Tunica and Jasper Counties. In none of the counties in which the disease decreased were special efforts made at either acclimatization or other preventive methods of a particularly striking nature.

The mortality from malaria decreased from 407 deaths in the 13 Delta counties during 1918 to 330 deaths in 1919. Respectively, the death rate decreased from 103.6 per 100,000 of population to 79.1. In Bolivar County the death rate decreased from 105.5 in 1918 to 74.0 in 1919, while in Sunflower County the rate decreased from 109.3 to 95.0. The death rate increased only in Tallahatchie County and was comparatively unimportant, or from 46.3 to 46.7. The death rate decreased in all the remainder of the 12 counties, for which the comparative statistics are available for the two years. It would, therefore, seem that while the disease was more frequent in 1919, it was less fatal. The ratio of deaths to cases was 46,509 in 1918 with 407 deaths, or .88 per cent, against 50,956 cases in 1919 with 330 deaths, or .65 per cent.

An effort will be made in the final report of the Committee to co-ordinate the monthly morbidity rates for the last five years to the corresponding climatological elements for such localities as make the information available. It may be said in this connection that the monthly mean temperature of Vicksburg, which is fairly representative at least for the lower portion of the Delta, was precisely the same during 1918 as during 1919, or 65.8 degrees, varying from the average for the decade only 0.4 points in excess. The rainfall, however, which had been 59.76 inches during 1918, or considerably in excess of an average of 49.06 inches for the decade, was 56.65 inches in 1919. Both 1918 and 1919 were, therefore, years favorable to a high rate of malaria frequency, particularly when compared with the year 1917, when the rainfall was only 39.94 inches. The two years 1918-1919 are the highest applies to the mean temperature of the dewfor the decade 1910-1919. The same conclusion for the decade, or 57 degrees. Aside from the point, which during 1919 was the highest on record foregoing, the mean relative humidity was also the highest on record during the year 1919, or 80 per cent, compared with an average of 74 per cent for the decade and 74 per cent for the year 1918.

In conclusion, attention may be directed to the malaria morbidity data for the year 1920, reported by the State Board of Health provisionally as follows:

January	3,909 cases
February	3,465 cases
March	4,193 cases
April	5,433 cases
May	7,295 cases
June	9,564 cases
July	14,134 cases
August	18,372 cases
September	24,041 cases
October	16,015 cases

These returns are for the State as a whole and clearly indicate that malaria remains, as heretofore, a problem demanding the most serious consideration not only on the part of the people concerned, but also on the part of the Federal Government and all other agencies in a position to render effective aid as far as may be possible in the light of the knowledge now extant.

Dr. C. C. Bass, Tulane University, New Orleans, La.—In estimating the value and in considering the usefulness of reporting malaria, there are two useful purposes which the reports may especially serve. One is statistical and the other is malaria control. For purposes of statistics, accuracy is, of course, very desirable. For purposes of control, accuracy is also important.

I have had the opportunity of observing and checking up the malaria reports of the physicians in one large county in Mississippi, taking the monthly reports for two years. Something more than 75 per cent of all the physicians in this county reported in multiples of five during the year. Such careless and inaccurate reports, I think, are largely the result of reporting by months or monthly reports. For statistical purposes monthly reports, on malaria at least, should be largely discounted. I am not sure that this may not be an exceptional group, but these are the facts.

For purposes of control of malaria monthly reports, by number of cases only, are of extremely little value. Comparatively little good can result from knowing the total number of cases of malaria that occurred in a given county over the entire month, and this is especially true if the numbers reported are grossly inaccurate. What is needed is the name and location of each case, the report to be followed up in some way to insure that the case is cured and ceases to be a source of infection to others. If a report of every case were made within twenty-four hours, the statistical value of such reports would be very much greater because of greater accuracy. The correct number of cases of malaria would be reported and the physician would not, as at present, hurriedly look over his books at the end of the month and put down some number that he guesses at.

It is true that perhaps it would be very much more difficult to get daily reports, and I am not at all prepared to argue that they should be demanded, or that they could be secured. I believe that reports of malaria made promptly after the diagnosis is made would be of much more statistical value and would also be valuable for purposes of control if the circumstances were favorable for carrying out proper control measures.

Dr. J. S. Mitchener, North Carolina State Board of Health, Raleigh, N. C.—North Carolina at the present time is operating under a law for the control and prevention of infectious diseases. At the next session of the Legislature we shall ask that our law be changed to control preventable diseases. This will give us, so to speak, a state-wide no fence law. Then we can make an effort to work along such lines as we see fit, and introduce each new disease at the opportune time.

Our machinery is very similar to the machinery of Alabama. We have the full-time county unit which is co-operating with the State, and in these two organizations the Department directs the

quarantine work locally. In the counties which have no full-time machinery whatsoever we have what we call the quarantine officer. The county is our unit from the executive viewpoint.

To secure complete and accurate reports of all cases, we must keep ever before us this one thing—a plan that will insure the greatest amount of good with the least amount of trouble to the medical fraternity. Upon that revolves the whole thing.

On malaria I have an open mind. What of the accuracy of the diagnosis of this disease? When a report comes to my office it is tabulated as malaria, typhoid or diphtheria. I practiced medicine in the eastern part of the State for two years, where we have the most of our malaria. I sometimes feel that if we have malaria on a twenty-four-hour report basis malaria is going to be the waste basket of our medical fraternity, and everything that they are uncertain of is going into the waste basket. We should consider that.

I am inclined to think that if we have a physician who is behind the work making weekly or monthly reports, he can scan over the list of patients for the time, if he keeps them, and say, "I believe from the clinical symptoms that Mr. Smith had malaria; that Mrs. Smith didn't." To get the data, a personal conference will be necessary and unless one is just doing a "demonstration work" it can hardly be done. The facility used by the family doctor in diagnosing malaria is not a high power microscope, but a quinin pill, and this pill is the treatment for many maladies.

Dr. Graham E. Henson, Jacksonville, Fla.—Malaria has been the greatest problem of the physician of the South for a great many years, and we feel that the reporting of it on a twenty-four-hour basis is not going to make any change in the situation.

I agree with the previous speaker that the immediate reporting of malaria probably would not accomplish the end desired, and it was well brought out that where the report of yellow fever immediately is a necessity on account of the infective period, so far as the mosquito is concerned, the same does not apply to malaria, for the simple reason that the sexual forms of the disease do not form in the human circulation until the disease has been present for many days. Regarding the good that can be accomplished by the reporting of malaria there is, of course, no argument. When it should be reported, it seems to me, should be left very largely to the attending physician.

A laboratory diagnosis should be required, or clinical evidence that it is a case of malaria beyond any dispute, before the case is reported as one of malaria.

Mr. Frank R. Shaw, Assistant Sanitary Engineer, U. S. Public Health Service, New Orleans, La.—We are confronted with securing our statistical data from a profession which is very strong in any community. It is absolutely necessary to have laws requiring certain reporting, but I have observed communities where a great deal of antagonism had been caused by demands and threats of prosecution. The result was that in these particular communities the doctors reported only such diseases as they felt necessary for their own protection. At the time of directing preventive measures in some of these communities a marked increase in reporting was secured by personal visits to the doctors or by letters urging their co-operation and pointing out the need of this information in conducting comprehensive campaigns. This experience indicated to me that doctors, like the majority of people, possess that human characteristic of desiring to respond to a request and a willingness to co-operate when shown the benefits derived therefrom, and naturally obstinacy when commanded.

Recently while connected with a municipal health department I had occasion to observe like results in the matter of morbidity reporting. The director of that health department urged co-operation and secured it. Prior to his taking charge the reports were very unsatisfactory and showed that during the previous year one more death had occurred from both tuberculosis and malaria than the number of cases reported and other diseases showed a very high mortality as compared to the morbidity. This director systematized his reports and devised a card which required the least amount of work from the doctors; it was self-addressed to the Health Department and signed. The doctor's work consisted simply of indicating his case by cross marks. Thus, by securing their personal confidence, developing interest and providing a simple means, the reporting was increased from a very low standard to about 90 per cent of the doctors in that community reporting every day. I do not think the same results would have been accomplished by force of law.

I had an opportunity to observe that doctors were unable in many cases definitely to diagnose malaria, as has been pointed out. I found that a doctor who was favorably inclined to the anti-malaria work being conducted in his community was disposed to consider certain cases of fever due to other conditions, and a doctor who was unfavorable to the work would report all cases of fever as malaria. Some expressed their own doubt in certain cases and said that they had not reported them.

I do not think that a diagnosis within twenty-four hours would bring about the desired results, for some cases seem to require a greater length of time to come to a definite conclusion.

Dr. L. D. Fricks, Surgeon, U. S. Public Health Service, Memphis, Tenn.—I am convinced of the importance of getting more accurate malaria statistics, and certainly a more general reporting of malaria throughout the South.

I fail to find myself in accord with Dr. Bass, or at least what I understood Dr. Bass to state, about malaria reports; that is, that the same accuracy is required in reporting malaria from a control standpoint as for statistical purposes. This does not seem to me to be necessary. For control purposes approximate figures will serve. This is the most important thing under the present conditions in the South. We have many communities in favor of malaria control and public sentiment aroused over the prevalence of malaria. They want to know what to do about it. The importance of collecting morbidity reports now is this: that unless they are started now the communities are going to have a more difficult problem in handling malaria later on, and they are going to fall just that much behind the com-

munities which have begun reporting. That is the need that is pressing now. We do not require the same standard of reporting for the various communicable diseases. Certainly, a case of yellow fever should be reported immediately in order that it may be controlled, but the question of whether you have 12 per cent or 20 per cent of malaria infection to begin with in a given community from a control standpoint is not vital. Next month or next year it may be quite different, depending entirely upon the number of carriers, mosquito production, amount of rainfall and many other social and economic factors. Malaria is an endemic disease and the public health officer only wants to know whether malaria is increasing or decreasing in his community and what the factors are which enter into the decrease or increase in that community. When we have done this we shall find that instead of malaria being evenly spread over the 412,000 square miles of potential malaria territory in the South there will be some areas where malaria infection has never occurred. Even in Louisiana and Florida and the Delta region of Mississippi, which, because of their slight elevation above sea level, are all potentially malarious, we find certain areas there that are comparatively free from malaria.

Dr. Griffitts' idea is a very good one to this extent: the state health officer should compel malaria reporting, unless he finds out from experience that persuasion is the best thing to try in the beginning. We must all admit the deplorable condition which exists at the present time in the reporting of malaria.

Dr. Leathers (closing).—It seems to me that Dr. Fricks struck the keynote with special reference to morbidity statistics in the problem of malaria. The health officers are facing certain practical questions in the development of their work, and in the consideration of the malaria problem before legislative bodies, it is desirable to present something definite from the standpoint of statistical data. It is not possible to discuss statistical information from the viewpoint of all the possible inaccuracies that may arise in collecting it, but I think the main thing is to emphasize certain essential facts as talking points. Such facts should be unquestioned and readily acceptable by those to whom the information may be presented. In the event that the general public is imbued with confidence with the public health work that has been done, information of this kind would have a remarkable effect in the proper development of such work, especially with reference to securing necessary appropriations.

I recall, for instance, during the last legislative session in our State, I took before the Committee on Appropriations graphs showing certain results in public health work in Mississippi. These illustrations proved to be very helpful. One member of the Committee said: "I can understand that kind of proposition," and I am prepared to support an appropriation on the results indicated. Illustrations of this character serve to make the whole question of disease control tangible and definite in the minds of those to whom such information is conveyed. When data is obtained over a series of years by a uniform method, whatever errors may exist will at least be common to the entire period. Therefore, the statistical information will be extremely significant and helpful.

In doing malaria work, and in fact, any kind of public health work, it does not seem necessary to antagonize the medical profession. When it is known that the medical men of the state represent a group which in the main are well educated and as a whole stand for the better things, it seems possible to project public health activities in such a way as to obtain their interest and co-operation. It is perfectly evident that we must work with the physicians day in and day out, and I do not think it wise to use a "hammer and tongs" method in dealing with medical men. It is my experience that physicians can be appealed to as no class in public health work. Any one who proceeds on the premise that it is necessary to antagonize the physicians, or be indifferent to their support and good will, is not likely to succeed in public health work. Our greatest strength in public health work in the future will be in the united support of the medical profession.

THE STANDARD TREATMENT FOR MALARIA — A DISCUSSION OF SOME OF ITS ADVANTAGES*

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At the last conference the National Malaria Committee[1] proposed a standard treatment for malaria for the purpose of curing the patient of his infection with the hope that it would be generally adopted by practicing physicians whereever malaria prevails in this country. The treatment proposed is as follows:

"For the acute attack 10 grains of quinin sulphate by mouth three times a day for a period of at least three or four days, to be followed by 10 grains every night before retiring for a period of eight weeks. For infected persons not having acute symptoms at the time only the eight weeks' treatment is required.

"The proportionate doses for children are: under 1 year, ½ grain; 1 year, 1 grain; 2 years, 2 grains; 3 and 4 years, 3 grains; 5, 6 and 7 years, 4 grains; 8, 9 and 10 years, 6 grains; 11, 12, 13 and 14 years, 8 grains; 15 years or older, 10 grains."

The object of the treatment is not only to relieve clinical symptoms, but to disinfect the patient in order to prevent relapse and transmission of the infection to others. Too little attention has been given

*Read before the National Malaria Committee (Conference on Malaria) meeting conjointly with the Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

in the past to this feature. The proportion of cases of malaria treated by physicians that are actually cured of the infection is ridiculously small. This is due largely to the inefficient methods of treatment employed. A standard method of treatment, if efficient, would tend at least to change this condition and considerably reduce the number of malaria carriers, potential sources of infection to others.

It has been my good fortune to be in position to observe[2] the use of this method of treatment employed on a large scale and also to hear the expressions of satisfaction from a great many practicing physicians who are following it. I feel that these observations and this experience fully justify me in offering a word of approval and a brief discussion of some of the advantages of the method.

It should be understood that the standard treatment is intended for ordinary and average cases of malaria and it is not expected to be applicable under all conditions. With regard to this point, the report of the Committee says:

"It is not claimed that this is a perfect or even the best treatment in all cases, but it is our belief that it is a good and satisfactory method for practical use to prevent relapse and transmission to other people."

However, it should be remarked that the cases in which the standard treatment is not applicable are extremely rare. They are so rare as to be almost negligible.

SULPHATE THE PREFERABLE SALT

Quinin sulphate is the salt of quinin recommended. Other salts are no doubt equally effective when given in doses of corresponding quinin content. The sulphate is the salt with which most people are familiar. It is the standard commercial article and is as cheap as, if not cheaper than, the other salts, considering its quinin content. Since the treatment necessary to disinfect must be continued for a long time, it is desirable to select the kind of quinin which people are most likely to take. It is reasonable to suppose that the sulphate, with which most people who live in malarious localities are familiar, would be more likely to be taken than salts less well known.

The theoretical ground for the choice of some of the more soluble salts is probably not well taken, as there is considerable experimental evidence that they are not more rapidly absorbed[3] than the sulphate. If such were the case, it would be a disadvantage instead of an advantage, because what is wanted in malaria is continuous absorption and continuous presence of quinin in the blood over considerable periods of time. If, therefore, the supposition that the more soluble salts are more rapidly absorbed is correct, the less soluble sulphate would be preferable.

MINIMUM EFFECTIVE DOSE DESIRABLE

The treatment for the relief of acute attacks of malaria should be to give the minimum amount of quinin that will accomplish the desired result in all or practically all cases. It is undesirable to use more, from the standpoint of economy and especially from the standpoint of the comfort of the patient. Large doses of quinin produce a great deal of discomfort in many patients and in some perhaps do permanent damage. It is undesirable, therefore, to give more than is needed. The acute symptoms of malaria are relieved and malaria parasites in the blood are killed out in some persons by much less quinin than is required for others. We have no way of knowing whether a given person will get the proper effect from the smaller amount of quinin required by others. If we could recognize in advance those cases who would be effected by the smaller amount they would be given only the doses necessary, but since we can not, all should be given the same known minimum effective dose. Thirty grains of quinin sulphate daily is about the minimum amount that can be dependent upon to stop the clinical symptoms as certainly and in as short a time as larger doses will. This dose has the advantage of effectiveness and, at the same time, of producing the minimum amount of discomfort commensurate with securing the desired results.

INTERVAL BETWEEN DOSES

Quinin given by mouth is slowly absorbed and slowly eliminated. When taken into a stomach containing food in process of digestion, the maximum concentration of quinin in the blood as indicated by the amount excreted in the urine is reached in about eighteen hours. This varies con-

siderably with different individuals. The amount excreted gradually decreases until it disappears in about 48 hours. It is very apparent that it would make little difference in the amount of quinin present in the blood at any given time during the twenty-four hours and therefore in the effect upon the malaria parasites that get out into the blood stream, whether the 30 grains daily quantity is given in one dose or in many divided doses. It is quite probable that the effect upon the malaria parasites would be practically the same.

The effect of 30 grains of quinin given at one time would produce considerably more discomfort to the patient and would be more likely to cause gastric irritation and perhaps nausea and vomiting than if it was given in divided doses. The smaller the divided doses, the less discomfort that is likely to be produced. However, if the number of doses is large, the inconvenience and trouble will necessarily be greater and, in fact, the inconvenience of taking medicine at very frequent intervals would overbalance any discomfort produced by somewhat larger doses. Again, if a large number of divided doses are given, it becomes necessary for the patient to be awakened from sleep to give them, especially if they are to be given at equal intervals apart. It is desirable, therefore, to strike a happy medium between the one extreme of giving the entire amount in one single dose and the other extreme of giving it in many divided doses. Almost all persons can take as much as 10 grains of quinin sulphate at a dose without any considerable discomfort being produced. If the interval is every eight hours, it is convenient. Therefore, 10 grains three times a day as specified in the standard treatment seems fully to meet the requirements. This interval between divided doses has the advantage of convenience, not subjecting the patient to unnecessarily unpleasant effects of large doses of quinin and of being as effective as any other intervals between doses.

METHOD OF ADMINISTRATION

There are three methods of administration of quinin available: intravenous, intramuscular, and oral. When quinin is given intravenously it reaches the blood stream at once and at once begins to exert whatever influence it may have on the malaria parasites present in the circulating blood. In many cases in which the life of the patient is in danger and in which it is necessary to get quinin into the blood at the earliest possible moment, this is certainly the method of choice. In all except very rare, pernicious cases of malaria, however, there is no such urgent demand and the patient can well afford to wait a few hours for the quinin to be gotten into the blood stream by administration by mouth. There is, after all, only a few hours' difference in the time necessary to get quinin into the blood, and there are extremely few cases in which these few hours would make any difference in their outcome. Administration of quinin intravenously is a formidable procedure, as, in fact, is administration of anything else in this way. Large doses sometimes cause profound effect and when very large they may destroy life. In every instance in which quinin is given intravenously a certain amount of risk is taken, both from the damage that may result from quinin itself and the possibility of introducing infection.

It is one of those spectacular procedures requiring special facilities and special technical ability which tend to complicate the treatment. Though many in their enthusiasm submit to the treatment, even in ordinary cases of malaria, it is to be condemned because of the risk that it takes without adequate advantage. It is not a practical method of treating large numbers of cases such as is needed for the benefit of the greatest number. There is no conclusive evidence at the present time that a single dose of quinin given intravenously is any more effective in killing parasites or sterilizing the patient than a corresponding amount given by mouth. Its only place, therefore, is in the very rare special instances where a dose or two should be given in this way until such time as it can be given by mouth.

Quinin administered by deep injection into the tissues is probably as effective dose for dose as a corresponding amount given by mouth. It is absorbed at a much

more variable rate, depending largely upon the amount of damage to the tissues, produced by the chemical irritation by the quinin solution. In some instances it is absorbed more rapidly than when given by mouth. In other instances it is absorbed more slowly and in some it remains in the tissues for many days or even weeks before it is finally absorbed or thrown off with the discharge from abscesses resulting from necrosis of tissue. The uncertainty of absorption and also the variability of the rate is such as to make it perhaps the least dependable method of administration and it has the very great disadvantage of causing more or less inflammation of tissue and a variable amount of discomfort to the patient. In many instances it is weeks or months before the tissues cease to give more or less discomfort. In fact, it is difficult to see how a physician who has any sympathy for the feeling of his patients could persist in this method of administering quinin in any except the rarest instances where it is not practical to give it in any other way. This method is also spectacular and requires special facilities and technical ability to carry it out. It is not a practical method of dealing with large numbers of cases of malaria.

Quinin administered by mouth is slowly but certainly absorbed and in the course of a few hours, not more than twelve to eighteen, the maximum effect on the malaria parasites in the circulating blood is obtained. Barring the somewhat short delay in time, it is as effective dose for dose as when administered in any other way. It is not spectacular, does not require special facilities for carrying it out or expert technical ability, and is uniformly effective. For these reasons administration of quinin by mouth is to be preferred under all except very rare and temporary circumstances. This method of administration has the advantage over the others of effectiveness, simplicity, not requiring expert ability or special technic, not being dangerous and of not producing the discomfort resulting from damage to the tissues often produced by other methods.

DURATION OF TREATMENT FOR RELIEF OF ACTIVE SYMPTOMS

The length of time over which the 30 grains of quinin daily should be given is "at least three or four days." The length of time necessary for this amount of quinin to stop the clinical symptoms of malaria in different individuals varies considerably. In nearly all of them the active symptoms stop in twenty-four to forty-eight hours. Rarely does a malarial paroxysm occur forty-eight hours after a patient has taken as much as 30 grains of quinin. It does, however, sometimes occur and perhaps in sufficient proportion of cases to justify the demand that the full dose treatment be continued longer than forty-eight hours. I am familiar with the fact that many think they have seen cases of malaria continue to have active fever or chills and fever for days and sometimes even weeks while taking 30 grains or more of quinin daily. Most of such cases are errors in diagnosis. In some instances no doubt malaria may have been present, complicated by or as a complication of some other disease which continued the clinical symptoms after the number of malaria parasites had been reduced to where they produced no symptoms. During the past five or six years I have had occasion to observe a great many cases of malaria under treatment. Out of that experience I do not recall a single instance in which patients continued to have fever or chills and fever due to malaria, and sufficient parasites in their blood as evidence, while taking as much as 30 grains of quinin daily over a period of four days. I do not say that such instances do not occur, but I do know that they are so rare in this country that I have not been able to see them. I can conceive of the possibility and recognize the probability that with the malaria that occurs in other parts of the world such may not be the case.

The treatment for the purpose of stopping clinical symptoms, since it is different from what is necessary after clinical symptoms have been relieved, should be discontinued as soon as the desired results have been obtained. In practically all instances this would be within three or four days. After the clinical symptoms have been relieved, then the treatment

necessary to disinfect the patient should be begun, replacing the treatment for the relief of the acute attack. To continue the treatment for the acute attack longer than it is necessary produces unnecessary discomfort in the patient. From the standpoint of the unpleasant effects of large doses of quinin and where large numbers of patients are to be treated, it would be an unnecessary waste of quinin. The advantages of the "at least three or four days'" treatment of 30 grains of quinin daily are that it is the minimum length of time that insures the desired results, and it is not unnecessarily wasteful of quinin nor productive of the unpleasant effects of large doses continued over longer periods of time.

FINAL CURE OF THE INFECTION IMPORTANT

After the acute symptoms have been relieved, the patient remains infected. There being some parasites in certain organs and tissues of the body, reproduction takes place and some parasites are thrown out into the circulating blood. If treatment should be stopped after the first acute symptoms have been relieved, the parasites multiply and may become sufficiently numerous to cause relapse. This may occur in a few days or in a few weeks or months. In other instances no relapse may occur, though the patient remains infected for many months. During all of this time, whether relapse occurs or not, the patient is a malaria carrier and a potential source of infection to others. Much of the spread of malaria results from malaria carriers who have had sufficient treatment to relieve the acute attacks, but have not been disinfected.

TREATMENT TO DISINFECT THE PATIENT AND PREVENT RELAPSE

After the acute attack is relieved, the object of the subsequent treatment is to disinfect the patient. The parasites that are lodged in the tissues can not be killed by any practical amount of quinin either during the acute attack or subsequently. All that can be done is to kill them in the circulating blood after they come out from the tissues. The question at once arises as to what amount of quinin is necessary to kill any parasites that appear in the circulating blood. Perhaps actual experience or observation is our most dependable guide. In my own experience I have observed several hundred persons living in an intensely malarious locality, some having active malaria at the time, many more having parasites but no symptoms, and still others having neither parasites nor symptoms, all taking 5 grains quinin daily. In one group of people this was continued for five months and in another for three months. During the time a considerable number developed clinical symptoms and parasites in their blood while taking the 5 grains quinin daily. This shows that 5 grains is not sufficient to kill the parasites. During the past four years I have also had the opportunity of observing several thousand persons either known to have malaria or supposed to have it, who took as much as 10 grains quinin daily. Though the circumstances were not such as to make it at all certain that every case of failure would have come to our attention, it is reasonably certain that a large proportion of them did. During this entire very extensive experience there have been only five instances in which patients developed clinical symptoms and parasites in their blood while taking the 10 grains quinin daily. These seem to be well authenticated cases and no doubt some others occurred. They are so extremely rare, however, as to be insignificant. The fact that these extremely rare instances have occurred, however, would seem to indicate that this is about the minimum dose that can be depended upon as reasonably certain to destroy parasites and prevent relapse. Five grains certainly does not do it. If 10 grains will accomplish this result, of course any larger dose would accomplish as much.

It would be objectionable to give more quinin for this purpose than is necessary, for purposes of economy as well as out of consideration for the comfort of the patient. Though practically all persons can take as much as 10 grains of quinin daily, even this amount produces considerable discomfort, especially in people who are up and about and active. The treatment for malaria after the acute attack has paseed is usually given to persons who are up and engaged in their usual activities. Quinin produces more discomfort

under such circumstances and the discomfort produced by unnecessarily large doses tends to prevent people from continuing the treatment long enough to accomplish the desired results. Since the treatment must be continued for considerable length of time, the miimum amout necessary to accomplish the results should be used. Basing my opinion upon the experience referred to, the experience of others, and upon the ground of not exceeding the minimum dose necessary, I believe that 10 grains is the proper daily dose for the purpose of disinfecting infected persons.

Whether the 10 grains should be given in a single dose or several divided doses is a question for consideration. In view of the fact that practically all persons can take 10 grains at one time without any considerable discomfort, and the further fact that the results so far as the destruction of parasites is concerned are approximately as good as if it were given in several divided doses, make it seem preferable that the full dose should be taken at one time. To take several divided doses during the day would be more trouble to carry out. Some of it is more likely to be forgotten and the time for taking some of the doses is likely to come at times when the patient has not his quinin convenient. Convenience is the chief advantage in taking one dose instead of the same amount in several divided doses during the day.

Quinin taken at night before retiring produces less discomfort than it does if taken in the morning or other times of day when the patient is more active. This difference in the unpleasant effect of quinin when the patient is in bed as compared to that when he is up and about is especially noticeable when larger doses are being taken. Many patients have considerable difficulty in going about when taking as much as 30 grains daily, while they are able to take the same amount or even more while confined to bed with much less discomfort. At night before retiring is also perhaps the most convenient time to take the dose. Taking it at this time has the advantage, therefore, of having less unpleasant effect and of being more convenient.

Quinin taken every day in the comparatively small amount of 10 grains produces much less discomfort than much larger doses taken during one or two days of each week. Notwithstanding certain experimental observations to the contrary, a dose of 10 grains quinin daily is more effective in destroying malaria parasites and preventing relapse than the corresponding total amount given during one or two days out of the week. In the interrupted treatment it frequently occurs that considerable numbers of parasites appear in the blood before time for the next quinin to be given. Such is not the case when it is given daily. After the parasites once disappear, seldom are more found. This seems to indicate very definitely that the daily dose is the most effective. The advantage of it is that it produces less discomfort and is more likely to be remembered and carried out. After one gets the habit of taking his daily dose of quinin he is much less likely to neglect it than if there were longer intervals between the treatment.

A question of very great importance is the duration of time necessary for the treatment to be continued to disinfect the individual. This is very variable in different individuals. One person may be disinfected by taking it for only a few days, another requires still longer and another one may require a very much longer period of treatment. Observations that I have been able to make indicate that 10 grains of quinin daily for a period of four weeks disinfects somewhere between 60 and 70 per cent of those who take it and that eight weeks disinfects more than 90 per cent, but even that does not disinfect 100 per cent. In order to disinfect 100 per cent no doubt it would require three or four months.

Unfortunately we have no way of recognizing in advance the person who will be disinfected in a short time or the one who will require longer treatment. It is also very unfortunate that we have no method by which we can examine the patient and determine that he has been disinfected. Negative blood examination does not prove that the patient is not still infected. The only dependable evidence as to whether an individual has been disinfected or not is the duration of treatment he has taken which is known to be effective.

Since treatment for a few days disinfects only a comparatively small proportion and treatment necessary to disinfect every individual would have to extend over a long period, it seems desirable to settle upon a middle ground which will be effective in almost all cases, though it is known not to be sufficient for all. The eight weeks' period resulting in disinfection of more than 90 per cent, as recommended in the standard treatment, is the proper period for all ordinary purposes. The advantage of it is that it is effective in nearly all cases and is about the minimum that will lead to disinfection of a sufficient proportion of cases. The 10 grains of quinin every night before retiring for a period of eight weeks also has the advantage of simplicity, which is important when considering the subject from a broad standpoint at least.

PROPORTIONATE DOSES FOR CHILDREN

Proportionate doses for children recommended deserve special commendation. In treating malaria in children it is customary to prescribe somewhat smaller doses of quinin than are given to adults, and there is a general impression that somewhat larger proportionate doses are required to accomplish as good results. Frequently the amount given children is very much larger than needed and entirely out of proportion to the size or age of the child as compared with adults. It is not an uncommon thing to see a child of only three, four or five years of age given half as much quinin as would be given to an adult. This is an unnecessary waste of quinin and it produces unnecessarily unpleasant effects. If the age of the patient is to be the guide, naturally there must be some inaccuracies. If the size or weight of the patient is to be the guide, there will also be inaccuracies, because the weight is frequently not known and is more difficult to guess than the age.

In the course of very extensive experiments in the treatment of malaria in Bolivar County, Mississippi,[4] the proportionate dose employed for children was one-twentieth of the adult dose for each year of age. A child ten years of age, for instance, would take one-half the adult dose, etc. Upon analysis of the results obtained, as shown by subsequent blood examination, it was found that there had not been as large a proportion of children disinfected as adults, indicating that the proportionate dose employed was not sufficient. With this data in hand it was practical, by proper calculations, to estimate what size doses for children of different ages would give the same results as are obtained in adults. After some adjustment to reduce the total number of different sizes required and to make it most convenient, the doses indicated for different aged children corresponds with that recommended in the standard treatment. The proportionate doses recommended by the Committee have the advantage, therefore, of correctness, no unnecessary waste of quinin, and of producing no unnecessary discomfort.

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DISCUSSION

Dr. T. F. Abercrombie, State Health Officer, Atlanta, Ga.—In discussing Dr. Bass' paper I am going to report our experience in Georgia, because we have used Dr. Bass' standard treatment for malaria.

In 1918 it was reported in one section of Georgit that malaria was causing a tremendous economic loss. The people were opposed to any malaria work being done in that community and the newspaper did not want us to go in there. With the assistance of Dr. Fricks and his department, we took over an area. I have forgotten its exact extent. We found that there were in it about twenty-nine hundred acres in cultivation, and the loss due to malaria alone was something over thirteen dollars an acre in cultivation.

In 1920 we started this work on a county-wide basis, and I think we did more toward the ultimate eradication of malaria in Georgia than could have been done by any other piece of work. The work has just closed there. There were six hundred thousand doses of quinin given in that county this year. The people who took the treatment were 10,239, divided as follows: white people, 6,849, and colored 3,490. There were 1,691 families. I think the report shows that out of this total of ten thousand people taking the treatment, there were something like 27 people who developed chills after completing the treatment. This bears out Dr. Bass' statement that it is not 100 per cent perfect. As to the ill-effect, there has been none reported there. This work has done more towards helping us to eradicate malaria in Georgia than any other piece of work that could have been undertaken.

Since this work has been under way we have had at least three representatives elected to the Legislature on an anti-malaria campaign. One man, immediately after the election, wrote me and said: "I want to introduce the first bill to get an appropriation to help eradicate malaria in our State." We have three or four counties now that say they are ready to put up the money.

We figured that this cost approximately 50 cents per capita over the county. It cost probably about a dollar and a half for each person taking the treatment, but since it is a county-wide proposition, we are figuring it on a per capita basis in the county. And that is the way we are going to figure it in our work next year, about 50 cents per capita. Three counties have indicated that they are willing to pay the money to eradicate malaria. It is to be followed up year after year, like the hookworm campaign.

I have argued for several years that to accomplish anything in the eradication of malaria we should put it on the same basis as the hookworm campaign. First, do something for the people who are sick and they will have confidence in any proposed plan for the eradication of the disease. There is some drainage work going on. As we all know, to accomplish definite results drainage is very essential. But for some time to come, at least in Georgia, we have to rely on other measures, such as quinin, fish control, screening, etc.

Dr. Graham E. Henson, Jacksonville, Fla.—A standard treatment for the control and eradication of malaria necessarily must provide for the dose to be employed, the frequency of the dose, the method of administration, the salt to be employed and the length of time the treatment should be carried on. One of the greatest blots in Southern medicine is the fact that malaria has prevailed as it has. If we had a standard treatment, if a standard treatment had been adopted by the profession twenty years ago, we should not have the disease prevalent at the present time. The dosage as provided for in the standard treatment that Dr. Bass has adopted is, I think, an ideal one. We should have proper dosage in the treatment of the disease. The frequency of the dose is another thing that is important. A very prominent surgeon in Chicago has sent out his reprints advocating a dose of two or three grains of quinin every two hours during the twenty-four hours for a three-day period. It is not necessary to submit our patients to such frequency of dosage.

In the method of administration I was rather pleased to hear Dr. Bass modify, or to my mind modify, what has been his past view regarding the intramuscular injection of quinin. I am in hearty accord with him that the intravenous administration of quinin should practically never be adopted.

I have seen cases, and you have all seen them, with the patient in such a condition that a dose of quinin is not retained in the stomach longer than a few moments. Now, what are we going to do with those cases? I have seen them die in a few hours. I have seen many a case that I believe was saved by a single intramuscular injection of quinin. One dose is sufficient to settle the stomach so that the patient is able to continue treatment by the oral administration of the drug.

Intravenous administration, I can not condemn too severely. I have never seen a malarial condition in which its use was justified. A few weeks ago I saw a child who, following a clinical diagnosis of malaria, was given, contrary to my advice, an intravenous dose of quinin, die on the table. This was a most just cause for a malpractice suit.

We should bear it in mind to regulate the dosage of the salt employed according to the amount of alkaloid in the salt. For instance, forty grains of bi-sulphate of quinin is the approximate equivalent of thirty grains of the sulphate, so that the varying amount of the alkaloid contained in the salts of quinin should be considered with the sulphate as a standard.

Dr. S. W. Welch, State Health Officer, Montgomery, Ala.—I wish to add my endorsement also to the condemnation of the intravenous use of quinin unless it is especially indicated. One of the most prominent doctors in Alabama was killed by an intravenous injection of quinin and the doctors who administered the dose were frank enough to admit it. The man was not seriously ill, but he asked for the intravenous injection because his stomach did not bear quinin well. They gave it, he immediately collapsed, and died in about an hour afterward.

Dr. L. D. Fricks, Surgeon, U. S. Public Health Service, Memphis, Tenn.—I should like to say a word about Dr. Abercrombie's discussion particularly. I assisted him in that work. The situation was like a wind storm or a tornado. It was very serious and something had to be done, and done quickly. Whether our work is only temporary or how much permanent good has been accomplished I can not say yet. The full reports have not come to my office, but I am greatly impressed with this: first, that there was a serious emergency to be met in Mitchell County, Georgia; the people were very sick indeed and the economic loss because of the perishable character of their crops was very great; and, second, that temporary relief at least was furnished to them. I should like to say that the gentleman in charge of that work, Dr. Coogle, did some excellent work at Camp Taylor in the way of typhoid inoculation. I should like to hear from him.

Dr. C. P. Coogle, Acting Assistant Surgeon, U. S. Public Health Service, Memphis, Tenn.—In Mitchell County, Georgia, last summer we followed Dr. Bass' plan and the results proved to be exactly what you would expect from his paper.

In dealing with malaria we deal with the people who are vitally concerned. They are sick and they have to take the medicine, hence we must satisfy them in order to get results. And in order to fet results quinin must be administered in a form and quantity which the people will take regularly over a considerable period of time. Quinin sulphate was administered to a large number of people in Mitchell County last summer, the doses given to adults being 8½

grains daily and to children between the ages of four and fifteen years 4¼ grains daily, and to children under four years of age, except babies, 2⅛ grains daily. All of these doses were given at night. Good results were obtained, although it was very difficult in the beginning to coax the negroes away from their chill tonics and place them on a definite and adequate dosage of quinin. This, however, was generally accomplished.

We started our campaign for a county-wide administration of quinin by interesting the plantation owners and managers from an economical standpoint. We secured their assistance in distributing the quinin to their renters and the farm laborers employed by them, through which means and by the establishing of fourteen free dispensaries scattered throughout the county, we succeeded in treating over 10,000 persons, or approximately two-fifths of the total population in Mitchell County. From information collected at the end of the summer, we appeared to have reduced the number of cases of chills and fever, active malaria, in the county, at least 50 per cent.

In tabulating the history cards of persons receiving quinin treatment in Mitchell County, it was found that 71 per cent of those who took quinin reported that they had had malaria within the last five years: 21 per cent reported that they had had malaria during 1919; and 13½ per cent had had an acute attack some time in 1920 before applying for treatment. Less than 50 persons reported having had chills after beginning the course of quinin which was prescribed.

It was originally planned to continue the daily administration of quinin to each person in Mitchell County who applied for it over a period of eight weeks; but the public demanded that it be continued and this was done until the end of the active malaria season.

The biggest problem encountered was in popularizing quinin treatment at the beginning of the season. After the people began to realize that those who were taking the standard dose of quinin daily were not having chills and fever, this problem solved itself. Fourteen free dispensaries were operated and a quantity of quinin sufficient for one week's treatment was dispensed at one time. This was placed in sealed envelopes containing 14, 7 and 4 capsules, respectively, and properly labeled—"2 capsules each night for adults over 15 years of age, 1 for children 4 to 15 years of age, and ½ capsule to children under four years of age." Of course, some delinquents were encountered. The whole 10,000 people did not take the standard dose of quinin for the full eight weeks' time, but the 10,000 did take it long enough to be benefited and some of them demanded that it be given to them over a period of eighteen to twenty weeks last summer.

Our work in Mitchell County adds proof to Dr. Bass' statement that quinin can be used in a malarious community with good results. There is no agent known to me which will appeal to the people more strongly because of the prompt results obtained in reducing active malaria than will quinin when properly administered. The officials of Mitchell County are enthusiastic over the results obtained and are already arranging with the State Health Officer for a continuation of this work next season.

During the administration of quinin we encountered a few minor complaints among the persons who were taking it; such as itching, moderate rash, intense ringing in the ears, profuse perspiration. But the total number of complaints was less than 100. Many persons were encountered who stated that they could not take quinin who nevertheless took it without serious complaint. Many farmers systematized their treatment by ringing a bell at night for all hands to come up and take their quinin.

Dr. Bass (closing).—I feel that the standard treatment which was adopted by the National Committee last year has not received as wide publicity as it should receive. I have been gratified to see that it has been adopted and employed very largely, not only in a few of the states where successful malaria work is being done, but in other states in the malaria section.

Another thing that has been gratifying is to hear the favorable reports of physicians who are now following the standard method.

There is another phase to which I should like to refer. Dr. Underwood, director of one of the county health organizations in Mississippi, told me a few days ago that in the county health work in which he is engaged the physicians treat their malaria cases with the standard treatment. Before he began work he got their co-operation to the extent that they agreed that all malaria cases referred to them would be given the standard treatment. He has taken an important step forward in health work. He has made sure that most of the cases of malaria that he discovers in his clinics and health surveys in the schools and elsewhere, which he refers to physicians, will be cured. This will go a long way towards getting rid of the disease.

The wide use of the standard treatment and the calls for it in many places where it can not be supplied at present emphasize the importance of an adequate source of supply of this standard treatment in convenient form. I do not know how it can best be provided, but this is something that should be given serious thought by those who are in position to contribute to a proper solution.

Finally, I wish to say that the standard treatment for malaria is looked upon as the product of the National Malaria Committee. I feel myself that it is an important factor at the present time and will continue to be an important factor in the reduction of malaria. I believe, therefore, that it behooves all of us who are interested in the control and reduction of malaria to contribute whatever we can to bring the standard treatment to the attention of others who have not had it brought to their attention in an impressive way.

THE DESTRUCTION OF ANOPHELES IN SCREENED DWELLINGS*

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Screening is an important factor in malaria prevention in any malaria region where methods of Anopheles destruction have not been or can not be made effective. In the region where the writer has been located for the past several years, screening appears to be the important factor that explains an apparent reduction in the amount of malaria among the white population. The effectiveness of screening in preventing malaria infection is supported by the early demonstration of Sambon and Low, in 1900, in the Roman Campagna, and by many further records down to the present time. The methods of screening for malaria prevention are also a matter of complete record in the literature.

More complete malaria control within screened dwellings by the collection of adult Anopheles trapped therein was first developed in the sanitary work on the Panama Canal Zone, as recorded by LePrince[1]. The Panama work related to the systematic, daily collection of adult Anopheles from inside the screened laborers' barracks. In the main this work was made necessary by the temporary nature of certain labor camps, where the expense of permanent control was not warranted, or in other situations where the permanent control measures had not become effective. The application of this method, as an adjunct to screening, was made possible by a standard type of dwelling, well screened, a population centralized as to domicile under one management, and with a trained organization to carry out the work. The method under these conditions proved effective and the application of the method to other conditions lends itself to further investigation and demonstration.

This paper is a summary of Anopheles quadrimaculatus collections from inside screened dwellings over a period of several years at Mound, La., located in the Delta region of the lower Mississippi Valley and under prevalent malaria conditions. The environmental factors are those common to the typical plantation conditions in the swamp country with a comparatively small white population surrounded by a comparatively large negro tenant population. The locations from which the records are selected for the purposes of this paper are those that represent the best examples of screening. The species of Anopheles given is the one concerned with the transmission of malaria in this region. The data as regards locations and years are not comparable, since the collections were not made systematically and are complete within the dwellings only in exceptional instances where definite effort was made to destroy them. The summary gives, however, some interesting results on the numbers in screened dwellings under conditions where special effort is made to exclude them, and permits a comparison between incomplete and incidental collections and complete collections. Some indication is also given, comparatively, as to numbers obtained by the several methods of obtaining complete collections. Further, there is included in these notes a summary of the biting records of the species of Anopheles under discussion to show the liability to infection within screened dwellings, a danger that threatens even where bed nets are used to supplement the screening protection.

Table I gives the details of all collections, arranged by years, and shows a total of 578 female specimens collected in 109 collections over a period of six years. This gives an average of 5.3 specimens per collection. The table shows the small numbers taken in the incidental collections, as compared with the complete collections, bringing out the accepted idea that Anopheles do not force their presence upon you as do certain more irritating domestic species. The table suggests also a certain amount of winter activity at this latitude.

Since the number of collections at the various locations varied, the average num-

*Read before the National Malaria Committee (Conference on Malaria), meeting conjointly with the Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

ber of specimens per collection is shown in Table II by locations. This includes all collections and gives a weighted average of 7.79 specimens per collection for each location. The variation in the averages for each location is explained by the variation in the number of collections for each location and by the absence of complete collections for some of the locations. A more accurate idea of the comparative numbers within the dwellings is obtained by a comparison of the incomplete collections, shown in Table III. This gives a total of 221 specimens in 95 collections, an average of 2.32 specimens per collection. The average number for all locations is

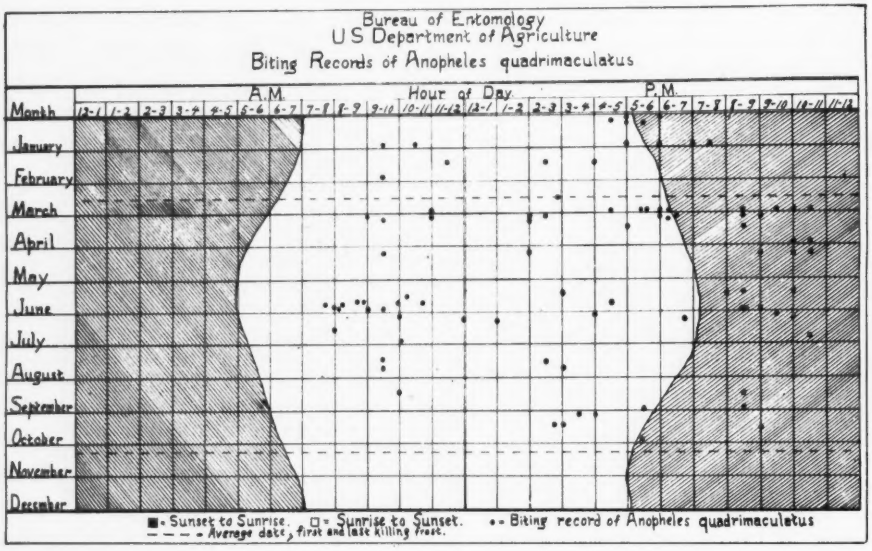

Chart I.

more important than the comparative average for each location, since the collections were not made in a comparative manner.

An approximation of the actual number within the dwellings is shown in Table IV, where the complete collections are given. There is a total of 357 specimens in 14 collections, an average of 25.5 specimens per collection. The methods for the complete collections consisted in two instances of killing them on the screens (one collection in the early morning and one in the late evening), of hand collection with flashlight and chloroform tube (the method used in the routine density collections at the regular density stations), and of fumigation with pyrethrum powder. The last method is not fumigation in the strict sense of that term. Pyrethrum powder is not highly efficient in killing mosquitoes unless burned in comparatively large amounts in a tightly closed room for rather an extended period. On the other hand, this substance is highly efficient in driving mosquitoes away when used in limited quantities.[2] The idea was conceived of supplementing the work of killing the mosquitoes at the screens by driving the mosquitoes to same by means of the fumes of this powder. It has been found that by burning not more than one ounce of pyrethrum powder to each room of ordinary size and closing the windows and doors of same for a few minutes, the mosquitoes trapped therein will seek to escape to the outer air when given the opportunity to do so by raising the window before one of the screens. Without going into further details of this method or into the circumstances and conditions of the many collections that have been made, incomplete and complete, one comparative instance will be given at one location

TABLE I

Collections, Anopheles Quadrimaculatus, Inside Screened Houses (arranged by years)

Month	Day	Location	No. Female Specimens	Collections	Remarks
1913					
Aug.	21	No. 38	2	Incomplete	
Sept.	26	No. 38	1	Incomplete	
Sept.	29	No. 38	1	Incomplete	
Oct.	1	No. 38	30	Complete	Fumigation
Oct.	14	No. 38	1	Incomplete	
1914					
May	6	No. 29	1	Incomplete	
May	7	No. 29	1	Incomplete	
May	11	No. 38	1	Incomplete	
June	10	No. 38	1	Incomplete	
June	11	No. 38	1	Incomplete	
June	11	No. 29	1	Incomplete	
June	12	No. 38	1	Incomplete	
June	13	No. 38	1	Incomplete	
June	14	No. 38	1	Incomplete	
July	1	No. 38	1	Incomplete	
July	3	No. 29	1	Incomplete	
July	4	No. 34	1	Incomplete	
July	6	No. 3	19	Complete	Flashlight
July	6	No. 38	1	Incomplete	
July	12	No. 38	1	Incomplete	
Sept.	14	No. 38	1	Incomplete	
1915					
Feb.	14	No. 52	1	Incomplete	
April	19	No. 38	1	Incomplete	
May	8	No. 38	1	Incomplete	
June	10	No. 38	1	Incomplete	
June	20	No. 38	1	Incomplete	
June	24	No. 29	3	Incomplete	
June	25	No. 29	4	Incomplete	
June	25	No. 51	1	Incomplete	
June	25	No. 38	2	Incomplete	
June	27	No. 38	1	Incomplete	
June	29	No. 38	15	Complete	Atscreens, early a. m.
June	29	No. 38	91	Complete	Fumigation
July	4	No. 38	1	Incomplete	
July	5	No. 52	1	Incomplete	
July	6	No. 52	1	Incomplete	
July	6	No. 29	2	Incomplete	
July	7	No. 38	1	Incomplete	
July	7	No. 52	1	Incomplete	
July	8	No. 38	3	Incomplete	
July	14	No. 29	19	Complete	Fumigation
July	15	No. 29	2	Incomplete	
July	16	No. 38	2	Complete	Fumigation
Oct.	13	No. 38	16	Complete	At screens, late p. m.
1916					
Mar.	29	No. 38	1	Incomplete	
Mar.	29	W.	1	Incomplete	
Mar.	30	No. 38	3	Incomplete	
Mar.	30	No. 51	2	Incomplete	
Mar.	31	No. 51	7	Incomplete	
Mar.	31	W.	4	Incomplete	
April	1	No. 38	5	Incomplete	
April	1	W.	8	Incomplete	
April	2	No. 29	1	Incomplete	
April	2	No. 51	1	Incomplete	
April	3	W.	6	Incomplete	
April	4	No. 51	1	Incomplete	
April	4	W.	4	Incomplete	
April	5	No. 38	4	Incomplete	
April	6	No. 38	1	Incomplete	
April	6	W.	21	Complete	Flashlight
April	7	W.	4	Incomplete	
April	8	W.	6	Incomplete	
April	10	W.	4	Incomplete	
April	11	No. 38	1	Incomplete	
April	11	W.	5	Incomplete	
April	13	No. 38	2	Incomplete	
April	13	No. 51	1	Incomplete	
April	14	No. 51	1	Incomplete	
April	14	No. 38	2	Incomplete	
April	19	No. 38	3	Incomplete	
April	29	No. 38	1	Incomplete	
April	30	No. 38	3	Incomplete	
May	1	No. 51	1	Incomplete	
May	7	No. 38	6	Incomplete	
May	7	No. 51	1	Incomplete	
May	8	No. 38	13	Complete	Flashlight
May	9	No. 38	1	Incomplete	
May	13	No. 38	2	Incomplete	
May	29	No. 38	2	Incomplete	

TABLE I—(Continued)

Collections, Anopheles Quadrimaculatus, Inside Screened Houses (arranged by years)

Month	Day	Location	No. Female Specimens	Collections	Remarks
June	22	No. 51	1	Incomplete	
Sept.	27	No. 151	3	Incomplete	
1917					
Jan.	28	R. C.	4	Incomplete	
Jan.	29	R. C.	2	Incomplete	
Jan.	30	R. C.	4	Incomplete	
Feb.	1	R. C.	10	Incomplete	
Feb.	19	R. C.	5	Incomplete	
Feb.	20	R. C.	22	Complete	Flashlight
Feb.	21	R. C.	5	Incomplete	
Feb.	22	R. C.	2	Incomplete	
Feb.	24	R. C.	2	Incomplete	
Feb.	24	No. 47	1	Incomplete	
Mar.	25	No. 151	1	Incomplete	
Mar.	25	R. C.	16	Incomplete	
Mar.	30	No. 51	1	Incomplete	
Mar.	30	K.	11	Incomplete	
April	15	No. 51	1	Incomplete	
April	18	No. 51	1	Incomplete	
April	26	No. 51	1	Incomplete	
May	2	No. 51	1	Incomplete	
May	14	No. 51	1	Incomplete	
May	25	No. 51	1	Incomplete	
May	28	No. 51	1	Incomplete	
July	31	No. 51	1	Incomplete	
Aug.	9	No. 51	1	Incomplete	
Oct.	11	No. 151	1	Incomplete	
1920					
June	11	T.	48	Complete	Fumigation 1 room
June	15	T.	28	Complete	Fumigation 1 room
June	18	T.	32	Complete	Fumigation 4 rooms
Sept.	15	No. 38	1	Complete	Fumigation

A total of 578 specimens in 109 collections.
An average of 5.3 specimens per collection.

TABLE II

Collections, Anopheles Quadrimaculatus, Inside Screened Houses. (Averages by locations.)

Location	No. Female Specimens	No. of Collections	Average per Collection
No. 52	4	4	1.
No. 51	27	20	1.35
No. 151	5	3	1.66
No. 29	35	10	3.5
No. 38	232	45	5.15
W.	63	10	6.3
R. C.	72	10	7.2
Miscellaneous	32	4	8.
T.	108	3	36.

A weighted average of 7.79 specimens per collection.

TABLE III

Collections, Anopheles Quadrimaculatus, Inside Screened Houses. (Incomplete collections.)

Location	No. Female Specimens	No. of Collections	Average per Collection
No. 52	4	4	1.
No. 51	27	20	1.35
No. 151	5	3	1.66
No. 38	64	38	1.68
No. 29	16	9	1.77
Miscellaneous	13	3	4.33
W.	42	9	4.66
R. C.	50	9	5.55

A total of 221 specimens in 95 collections.
An average of 2.32 specimens per collection.
A weighted average of 2.75 specimens per collection.

TABLE IV

Collections, Anopheles Quadrimaculatus, Inside Screened Houses. (Complete collections.)

Location	No. Female Specimens	No. of Collections	Average per Collection
No. 29	19	1	19
Miscellaneous	19	1	19
W.	21	1	21
R. C.	22	1	22
No. 38	168	7	24
T.	108	3	36

A total of 357 specimens in 14 collections.
An average of 25.5 specimens per collection.
A weighted average of 23.5 specimens per collection.

TABLE V

Collections, Anopheles Quadrimaculatus, Inside Screened Houses. (Summary by method of collection.)

Method of Collection	No. Female Specimens	No. of Collections	Average per Collection
Incidental & incomplete	221	95	2.32
At screens, early a. m. and p. m.	31	2	15.5
Flashlight	75	4	18.75
Fumigation	251	8	31.37

where the incomplete or incidental collections averaged 1.68 specimens per collection in 38 collections. One early morning careful search was made for mosquitoes on all the screens and 15 female Anopheles quadrimaculatus were collected from the screens inside the dwelling. That same afternoon all rooms in the house were "fumigated" with pyrethrum powder, using the powder in the method described, and 91 additional female specimens of this same species were collected from the screens as they attempted to escape from the fumes of the burning powder. Table V gives a summary of the average number of specimens collected by the various methods of collection that have been mentioned.

It is believed that these data show that under most favorable conditions of screening, where special attention is given the exclusion of mosquitoes from dwellings, that sufficient numbers gain entrance to insure transmission of malaria, in view of the large surrounding tenant population among whom the disease is prevalent and upon whom the white population depend for labor and for household servants. It would appear that in the case of infective Anopheles gaining entrance to a screened dwelling occupied by a human carrier, the requirements of malaria transmission are met by a much lower Anopheles density than in a dwelling in which the Anopheles are not trapped.

Just as these figures on the numbers of Anopheles in screened dwellings tend to show that screening alone does not give complete protection and can be made more effective by the destruction of the mosquitoes that gain entrance, so also certain figures will now be presented to indicate that protection from Anopheles only after nightfall or while asleep does not remove one from the liability of infection. Table VI gives the details of 89 biting records of Anopheles quadrimaculatus over the same period as covered in the records of collections from screened dwellings. This table shows the daytime biting habits of this species, as well as its winter activity at this latitude. These records are those obtained in spite of avoiding foci of infection after nightfall and making use of the protection afforded by screening. The records after nightfall are naturally those within protected places. No comparisons can be drawn between daytime and night biting or between the various locations given. The data are of interest in showing that this species does bite during the daytime and within screened houses will bite at any hour of the day. This point is brought out in Table VII, in which the biting records are arranged by location and hour of the day. Out of 89 biting records, 52 records, or 58 per cent, of same were made within screened dwellings. These records on biting are arranged in Table VIII to show their distribution by months in comparison to the adult Anopheles collections within screened dwellings. A total of 578 specimens was collected, of which 52 gave biting records, that is, 9 per cent of the Anopheles collected inside screened houses gave biting records and these biting records were distributed through nearly every month of the year and over all hours of the day and night, not including the hours of sleep. These records are shown in graphic form on Chart I.

The conclusion is that under the conditions of this region screening does not give complete protection from Anopheles and that those which gain entrance to the dwellings should be regularly destroyed by the simple method suggested by the Pan-

TABLE VI—BITING RECORDS, ANOPHELES QUADRIMACULATUS

Year	Month	Day	Hour	Locality	Location	Remarks
1913—	Sept.	29	5:30 p. m.	Mound, La.	No. 38	Screened, inside
	Oct.	14	9:00 p. m.	Mound, La.	No. 38	Screened, inside
1914—	May	6	9:30 a. m.	Mound, La.	No. 29	Screened, inside
	May	7	2:00 p. m.	Mound, La.	No. 29	Screened, inside
	June	10	8:30 p. m.	Mound, La.	No. 38	Screened, inside
	June	11	3:00 p. m.	Mound, La.	No. 29	Screened, inside
	June	12	8:00 p. m.	Mound, La.	No. 38	Screened, inside
	Aug.	17	2:30 p. m.	Greenwood, Miss.	Office	Screened, inside
	Aug.	21	9:30 a. m.	Greenwood, Miss.	Office	Screened, inside
	Sept.	14	8:30 p. m.	Mound, La.	No. 38	Screened, inside
1915—	Feb.	13	4:00 p. m.	Mound, La.	Woods	Near lumber camp
	Feb.	13	11:30 a. m.	Mound, La.	Cabin	Unscreened, lumber camp
	Feb.	13	2:30 p. m.	Mound, La.	Cabin	Unscreened, lumber camp
	June	10	10:00 p. m.	Mound, La.	No. 38	Screened, inside
	June	15	10:15 a. m.	Mound, La.	No. 67	Unscreened, inside
	June	20	8:40 a. m.	Vicksburg, Miss.	River	On board ferry
	June	20	8:55 a. m.	Vicksburg, Miss.	River	On board ferry
	June	24	7:45 a. m.	Mound, La.	No. 29	Screened, inside
	June	24	8:15 a. m.	Mound, La.	No. 29	Screened, inside
	June	24	10:00 a. m.	Mound, La.	No. 29	Screened, inside
	June	24	10:45 a. m.	Mound, La.	No. 52	Toilet
	June	25	8:00 a. m.	Mound, La.	No. 38	Screened, inside
	June	25	8:05 a. m.	Mound, La.	No. 38	Screened, inside
	June	27	9:00 a. m.	Vicksburg, Miss.	River	On board ferry
	June	27	9:30 a. m.	Vicksburg, Miss.	River	On board ferry
	June	27	8:30 p. m.	Tallulah, La.	Hotel	Screened, inside
	June	27	8:35 p. m.	Tallulah, La.	Hotel	Screened, inside
	June	27	9:00 p. m.	Mound, La.	No. 38	Screened, inside
	July	1	4:00 p. m.	Tallulah, La.	Office	Screened, inside
	July	2	9:30 p. m.	Tallulah, La.	Hotel	Screened, inside
	July	2	10:00 a. m.	Mound, La.	No. 52	Toilet
	July	4	10:00 p. m.	Mound, La.	No. 38	Screened, inside
	July	5	6:45 p. m.	Mound, La.	No. 38	In yard, outside
	July	6	12:00 noon	Mound, La.	No. 52	Screened, inside
	July	7	1:00 p. m.	Mound, La.	No. 52	Screened, inside
	July	19	8:00 a. m.	Mound, La.	No. 52	Toilet
	July	26	10:30 p. m.	Tallulah, La.	Theater	Unscreened, inside
	July	27	10:05 a. m.	Tallulah, La.	Office	Screened, inside
	Aug.	21	3:00 p. m.	Vicksburg, Miss.	Hospital	Screened, inside
1916—	March	30	8:30 p. m.	Mound, La.	No. 51	Screened, inside
	March	30	10:00 p. m.	Mound, La.	No. 38	Screened, inside
	March	31	11:00 a. m.	Mound, La.	No. 51	Screened, inside
	March	31	4:30 p. m.	Mound, La.	No. 30	Screened, inside
	March	31	5:30 p. m.	Mound, La.	No. 51	Screened, inside
	March	31	5:35 p. m.	Mound, La.	No. 51	Screened, inside
	March	31	6:00 p. m.	Mound, La.	No. 51	Screened, inside
	March	31	6:15 p. m.	Mound, La.	No. 51	Screened, inside
	March	31	9:30 p. m.	Mound, La.	No. 51	Screened, inside
	April	1	9:00 a. m.	Mound, La.	No. 51	Screened, inside
	April	1	2:00 p. m.	Mound, La.	No. 51	Toilet
	April	1	2:30 p. m.	Mound, La.	No. 51	Screened, inside
	April	1	8:30 p. m.	Mound, La.	No. 51	Screened, inside
	April	1	9:00 p. m.	Mound, La.	No. 51	Screened, inside
	April	2	2:00 p. m.	Mound, La.	No. 29	Screened, inside
	April	2	11:00 a. m.	Mound, La.	No. 51	Screened, inside
	April	2	6:00 p. m.	Mound, La.	No. 51	Screened, inside
	April	2	6:30 p. m.	Mound, La.	No. 51	Screened, inside
	April	6	6:15 p. m.	Mound, La.	No. 38	Screened, inside
	April	6	9:30 a. m.	Tallulah, La.	Office	Toilet, outside
	April	13	8:30 p. m.	Mound, La.	No. 51	Screened, inside
	April	14	5:00 p. m.	Mound, La.	No. 51	Screened, inside
	April	29	10:30 p. m.	Mound, La.	No. 38	Screened, inside
	April	30	10:00 p. m.	Mound, La.	No. 38	Screened, inside
	May	7	9:00 p. m.	Mound, La.	No. 51	Screened, inside
	May	7	10:00 p. m.	Mound, La.	No. 38	Screened, inside
	May	7	10:30 p. m.	Mound, La.	No. 38	Screened, inside
	June	22	4:30 p. m.	Mound, La.	No. 51	Screened, inside
	Sept.	27	8:30 p. m.	Mound, La.	No. 151	Screened, inside
1917—	Jan.	2	5:00 p. m.	Quebec, La.	Woods	
	Jan.	2	6:00 p. m.	Quebec, La.	Woods	
	Jan.	3	4:30 p. m.	Quebec, La.	Woods	
	Jan.	9	5:00 p. m.	Mound, La.	Woods	Near lumber camp
	Jan.	9	5:30 p. m.	Mound, La.	Woods	Near lumber camp
	Jan.	28	7:00 p. m.	Mound, La.	R. C.	Screened, inside
	Jan.	29	7:30 p. m.	Mound, La.	R. C.	Screened, inside
	Jan.	30	9:30 a. m.	Mound, La.	No. 26	Unscreened, inside
	Jan.	30	10:30 a. m.	Mound, La.	No. 26	Unscreened, inside
	Jan.	30	5:00 p. m.	Mound, La.	Woods	In open
	Jan.	30	6:00 p. m.	Mound, La.	Woods	In open
	Feb.	25	9:30 a. m.	Mound, La.	No. 26	Unscreened, inside
	March	25	10:30 p. m.	Mound, La.	No. 151	Screened, inside
1920—	March	15	2:55 p. m.	Mound, La.	Woods	
	Aug.	16	9:30 a. m.	Mound, La.	Woods	
	Sept.	13	10:00 a. m.	Mound, La.	Woods	
	Oct.	4	3:30 p. m.	Mound, La.	Woods	
	Oct.	4	4:00 p. m.	Mound, La.	Woods	
	Oct.	14	2:45 p. m.	Mound, La.	Woods	
	Oct.	14	3:00 p. m.	Mound, La.	Woods	
	Oct.	27	5:30 p. m.	Mound, La.	Woods	

ama experience, supplemented by the use of pyrethrum powder. A further conclusion is that Anopheles quadrimaculatus, at least, deprived of a blood meal at nightfall or later, will bite any time of the day or night when temperature conditions are suitable and the opportunity offers.

TABLE VII

Biting Records, Anopheles Quadrimaculatus. (Arranged by location and hour of day.)

Hour of Day	Screened House	Unscreened House	Toilet	Woods	Office	Miscellaneous	Totals
A. M.							
7:00 to 8:00	1	....	....	....	....	....	1
8:00 to 9:00	3	....	1	....	....	2	6
9:00 to 10:00	2	2	1	1	1	2	9
10:00 to 11:00	1	2	2	1	1	....	7
11:00 to 12:00	2	1	....	....	....	....	3
P. M.							
12:00 to 1:00	1	....	....	....	....	....	1
1:00 to 2:00	1	....	....	....	....	....	1
2:00 to 3:00	3	1	1	2	1	....	8
3:00 to 4:00	2	....	....	2	....	....	4
4:00 to 5:00	2	....	....	3	1	....	6
5:00 to 6:00	4	....	....	5	....	....	9
6:00 to 7:00	5	....	....	2	....	1	8
7:00 to 8:00	2	....	....	....	....	....	2
8:00 to 9:00	9	....	....	....	....	....	9
9:00 to 10:00	6	....	....	....	....	....	6
10:00 to 11:00	8	....	....	....	....	1	9
Totals	52	6	5	16	4	6	89

TABLE VIII

Collections and Biting Records, Anopheles Quadrimaculatus, Inside Screened Houses. (Arranged by months.)

Month	No. of Specimens	No. of Biting Records
January	10	2
February	48	..
March	47	10
April	89	13
May	34	5
June	234	13
July	58	4
August	3	1
September	7	3
October	48	1
Totals	578	52

Nine per cent of specimens collected inside screened houses have record of biting.

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2. Howard, L. O.: Preventive and Remedial Work Against Mosquitoes. Bulletin 88, Bureau of Entomology, 1910, pages 30-32.

DISCUSSION

Mr. J. A. LePrince, Senior Sanitary Engineer, U. S. Public Health Service, Memphis, Tenn.—People have the general impression that because the Anopheles does not bite in the full sunlight it does not bite in the day time; it does in semi-shade and indoors—which is semi-shade.

Regarding the question of this catch as applied at Panama, it was not altogether limited to barracks buildings. Our laborers on the railroad lived in screened box cars. When a lot of men are in a car, negroes in particular, it is their custom to prop the screen door open. They all come home at dusk and prop the screen door open, so you might say such cars or habitations were not screened. However, we found that by catching the Anopheles in the cars in the morning the percentage of malaria among the men located on the railroad, sleeping in cars in swampy districts was lower than among the men living in the hill country in what was supposed to be the healthy district.

Of course, you could not examine a laborers' sleeping car without a lamp.

The application of this method of control by means of catching the vectors was also applied to the natives' living quarters, or in the cane huts, and was very successful. Where our camps moved from time to time they were surrounded by native houses built out of cane and odds and ends. We kept our malaria rate very low by making daily catch of the Anopheles. The Anopheles that takes blood is apt to remain very close to where it gets that meal, and that is what makes the daily catch so effective.

Where we had a barrack building, say a room almost as big as this one, with anywhere from sixty to one hundred and twenty persons sleeping in the one open room, it is an easy matter to control malaria by catching the Anopheles in the room. On the contrary, the screening of such a building is far less effective than the screening of an average residence, because these doors are kept open more or less continuously with a string of ten to twenty men entering at a time. The Anopheles follow the men into the building.

I think some very valuable experimental work can be done in this country by applying this matter of destruction of Anopheles to houses where the house tenant is not in any way interested by using the children to do the catching, but we must have an incentive or the work will not succeed.

Mr. Van Dine brought out the very interesting point of the ability of Anopheles to get into houses. Where other mosquitoes can not find a way into houses, Anopheles not only can but do. They find the one opening, if there is one, and the important question related to this subject is how do they get into the house? What are the principal entrances? Can we improve our general system of screening or mosquito proofing? Because in reality screening is only a part of mosquito proofing. There are some men here in the audience who have had considerable experience with the question of Anopheles in malarial regions coming down chimneys, and I wish they would state just what their findings were.

I believe that a large quantity of our Anopheles come in by way of the back door, the kitchen door. We are very careful to look after the front door and to know that that door is safe, but what is going on in the meantime at the back door? It makes a good deal of difference whether you have a married cook or not whether that door is kept open during the mosquito flight period.

The question of the vestibule door is important. Now, if you had a screened door in the wall of a house, that is an apparent entry for the Anopheles. If that were vestibuled there are the equivalent of three doors. Then we only get a portion of the Anopheles into the building that could pass a screened door. On a screened porch, where the screened door is comparatively small

compared to total surface screened, say one-tenth of the entire surface of screen, our chances of entry of Anopheles become still smaller and that is an important point.

Then, again, the question of the location of the door is exceedingly important. Any of you that are in regions heavily infested with mosquitoes should examine corners in buildings. That is, wherever you have a re-entrant angle—and there are many such—you will find that is the place where your Anopheles occur, and the last place where even a screen door should be located.

In certain regions during the mosquito season we have a prevailing wind, and it would be most advisable to have the door on the windward side of the house the only door used during that season and the other one fastened up. Let's get down to a one-door house during the mosquito season.

I took my family down to the Isthmus of Panama and none of them got malaria. I know of several other cases where the Canal men were equally careful and there was no case of malaria in the family. But I was one of the unfortunates who was frequently bitten in the day time. I am going to refer to that in a moment again.

As long as the question of screening has come up at all, I want to state that we have looked with care into the question of the possibilities of screening of negroes' houses. It is a very important subject. It means a profit or loss to the farmer of the South. We have attempted time and time again to screen the negro quarters in the same way we screen the white quarters. There are probably other methods of screening those houses, and I think everybody interested in malaria control in the South should give that matter serious thought.

The question of bed nets has been mentioned. I consider a mosquito bar something that ought to be eliminated as absolutely useless. They give a false sense of security. I know of cases where persons are using mosquito bars in screened houses. Now, they are not fooling the Anopheles at all; they are fooling themselves and nobody else. Those of you that get into houses where there are mosquito bars will find that the mosquito bar, like a spider web, is the favorite resting place of an Anopheles. It rests there and as soon as a sleeping person's body touches the netting he is bitten.

When using mosquito bars for collecting Anopheles in South Carolina I noticed that our Anopheles there were very sociable. We found that a small percentage of them only bit us. The rest simply came in because we happened to be there. When we left the net during the night they all came out, and when we returned again half an hour later they came into the net with us. Apparently they followed up their food supply and took it when they were ready.

Regarding this matter of biting indoors, I contracted malaria several times by being bitten while carrying out our mosquito catching. One of my assistants was bitten so frequently that I had to take him out of that work and put him on other work. Another man that we used particularly on that work because of his interest in it, died of pernicious malaria. He used to check his mosquito catchings daily. He was a very conscientious fellow, and sometimes he was bitten ten or fifteen times a day.

Regarding the hibernation of mosquitoes, I know at Scott, Miss., where the Anopheles hibernated during cold weather under the house, even after a heavy freeze we found the Anopheles under the house freshly gorged, apparently feeding on the dogs there. At Harrison, we found them in February one morning where two inches of ice had formed the previous night. Again at Columbia, S. C., at a temperature of 30 degrees, we found gorged Anopheles in the barns. Those were three-sided barns.

I think that question of the difference between shaded and direct sunlight wants to be well fixed in our minds. I know only of two cases where the Anopheles have obtained a blood meal in the full sunlight.

I should like to ask Mr. Van Dine two or three questions as to whether or not the same buildings always give the biggest catch, whether in any group of buildings there are many more Anopheles in some buildings than in others. We have found in some instances, regardless of the species of Anopheles, that they preferred to remain in two buildings of a group of twenty, and we frequently get more in some buildings than in others, and the same relation will hold week in and week out throughout the Anopheles season.

It would be interesting also to know whether pyrethrum drives from the building the freshly gorged Anopheles. I have noticed time and again Anopheles resting on the screens early in the morning about three hours after daylight, but that doesn't include the freshly gorged specimens. They have a tendency to stay back in the house and do not attempt to fly until the meal is digested.

Dr. T. H. D. Griffitts, Surgeon, U. S. Public Health Service, Norfolk, Va.—This subject of screening against the vector of malaria is one of great importance. When we consider that malaria is essentially a rural problem, and is in many parts of the country where drainage is not feasible, or not economically possible; when we consider that the administration of quinin, however efficient, is, more or less, a temporary makeshift, we must finally come back to screening the houses of the people and keeping the mosquito away from them. I believe that in some sections of the country where malaria has been reduced greatly even the ordinary type of screening has in a measure resulted in such reduction.

I know of no greater instance in history of the reduction of malaria than in Dr. Williams' State, Virginia, where at one time 50 per cent of the population had malaria, and where today in a great portion of the State malaria is an unknown quantity. It is a historical record that in the Jamestown colony 50 per cent of the people had malaria the first summer!

In malarious localities every person should consider a house not a home unless it is screened. In such districts it's just as essential to have screens to exclude Anopheles as glass to include light. It is more important. There are so-called screened houses that are even worse than unscreened houses, and I shall venture to say that unless there is expert supervision over the screening of houses there is not one out of a hundred houses in the community that should be regarded as a screened house.

I remember one instance in South Carolina where we instructed the farmer how to screen his house, using sixteen mesh, and just exactly how the window should be screened and the door should be hung, always to open outward, went into every detail, and we went back the next year and he said he was still having mosquitoes, and we asked him if he had screened the chimney. He said: "No; I forgot about that." He said they were having almost as many mosquitoes in the house as they had last year. We had him screen the chimney—not the top of the chimney, but the fireplace—and then we went out there and checked up the mosquitoes in the fireplace and got twenty-four Anopheles quadrimaculatus. This was a two-story house with fireplaces on each floor. A house is not a screened house unless the chimney is screened. Don't omit that one detail, because it is very important.

People, as a rule, use their porches a great deal in the summer time, and it is a very important factor. They sit on the porches in evenings during Anopheles flight and get infections. Porches so used must be carefully screened. A. punctipennis is especially a bad biter on piazzas, though relatively scarce indoors.

Mr. Van Dine (*closing*).—In closing the discussion, I want to make a statement on screening and then answer the questions Mr. LePrince has asked. I wish to take the position that screening itself is not on trial. Screening is not open to argument; it is a thing that has been demonstrated. If you will screen properly, then you have done a great thing in preventing malaria. The method itself is assured. It is the application or extension of the method that is open to discussion and investigation. If you take a typical negro cabin with an open floor, no two windows alike, a big fireplace going down through the middle and screen it as well as you can, you can not compare the results obtained with those in a well-screened modern dwelling occupied by white people who understand, and who are alert to the danger. If we made no reduction in the tenant family as regards malarial infection we are not condemning screening. It would be the application that failed, and I am especially interested in the point Mr. LePrince made about the construction of the houses. A standardized house that will lend itself to screening is the big thing in the extension of screening among the negro tenant class.

As to the variation in the relative numbers of the mosquitoes about the screened houses, I should say that there was a variation in the numbers at the places where these investigations were made. In house No. 38 in this paper there was an entrance, such as Mr. LePrince described, in the corner in the back. When all other locations failed of Anopheles, you could always go back to this location where it was cool and shady and obtain specimens. This location was, during the first two or three years, a fruitful source of malarial mosquitoes inside. But the very observations we were making defeated the purpose of the investigation. You can not go in a place and start in to fumigate and stir them all up without their taking action. They want to know about it, and the first thing you know they have changed their entrance. That very thing happened in this location. My figures would have been mighty fine if I could have carried them all out under conditions as I found them in 1913, but, just as an illustration, in the house where I found them constantly for a long time and after a fumigation I obtained ninety-one, this last year, without giving any attention to the place, I dropped back and thoroughly fumigated this house and obtained only one Anopheles right at the height of the density with thousands in and about the other buildings and the adjoining cabins. That, I believe, is very suggestive. The very fact of impressing upon their minds the necessity of keeping mosquitoes out of the house aroused them to the necessity of good screening. I have always urged not more than two entrances. I think if we could carry it to the one entrance idea it would be a big thing, but many houses have from five to six.

The question of the action of pyrethrum on newly engorged females was not observed except in so far as we made a complete collection and obtained engorged specimens. In the places where I had made a complete collection I have dropped back after a period of two or three weeks and made another complete catch, as distinguished from incomplete, and I have never obtained the same number, and in many cases have obtained very few specimens. Whether the engorged female remained in there and died, that is a question of longevity, or whether they were driven out by the pyrethrum and collected, I can not say. The work suggests that it did drive out practically all of the mosquitoes.

The work of fumigation has opened our eyes to the importance of closing the doors of a room and opening the closets and shaking clothing and shifting things, while the room is filling up with the fumes, thus disturbing the mosquitoes and getting them on the wing and driving them to the screens. I can not give the comparative numbers of fed and unfed mosquitoes. I did not make that segregation. It would have been interesting if I had, but I recall distinctly that certain of the catches were engorged.

CO-OPERATIVE ANTIMALARIA CAMPAIGNS IN THE UNITED STATES IN 1920*

BY J. A. LEPRINCE,
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The success of the experimental demonstration campaigns carried on in Arkansas for several years showed the wisdom and advisability of extending such operations to other states where the elimination of malaria is of the utmost importance to the proper normal development of the state and the welfare of its citizens.

With this in view, a co-operative agreement for undertaking malaria control campaigns was made by the state health departments of ten states, the International Health Board and the United States Public Health Service.

The plan agreed upon was for the state health officer to select the communities thought to be most desirable for demonstration purposes, and for the state health department and the local community to arrange for financing the work with local funds and state funds. In instances where state and local health authorities were unable to provide immediately all the funds necessary to carry on the malaria control measures indicated, the International Health Board agreed to provide a certain percentage according to budgets approved by the parties to the co-operative agreement.

The United States Public Health Service agreed to supervise field operations.

It was planned for:

The mayor and the town council of each town selected to sign an agreement with the co-operating agencies, promising to comply with the contract, to adopt and enforce an ordinance against mosquito propagation, agree to arrange so that the work would be carried on by the community as a permanent feature and be financed by the community after the first season's work.

Also that the field director assigned by the United States Public Health Service should confer with the state health officer, make preliminary and detailed surveys of proposed locations, submit recommendations for approval to the co-operating agencies, supervise field operations and render progress and financial reports monthly to the local authorities and co-operative agencies.

Further details of the co-operative plan will be reported later.

The state health officers of Alabama, Arkansas, Georgia, Louisiana, Mississippi North Carolina, South Carolina, Tennessee, Texas and Virginia wisely undertook malaria control work under this co-operative plan.

Naturally the question of financing the campaigns, being a new departure for some states, was not an easy problem. Much has been learned regarding local financing of campaigns.

Now that the difficulty has been partially or temporarily overcome, it is gratifying to note that one important result of the co-operative work is that five states, through the extra efforts of the state health officers, succeeded in obtaining special appropriations for malaria control measures amounting to $30,000 for the present year; that three of these states already have appropriations assigned for 1921 and one state has an annual appropriation for malaria control for the next three years. In addition to states referred to, state funds to a more limited extent were used by four other states. Unquestionably those state health officers who were unable to obtain a definite appropriation for antimalaria work this season will feel the benefit and take advantage of the fact that the state officials of neighboring states have seen fit to start the state battle against malaria.

Even though in many instances the work was undertaken late in the season, 46 new demonstrations have been undertaken, covering an area of approximately 192 square miles and giving protection to approximately 199,319 persons.

Several facts of importance have been brought out. The most important is the necessity of sufficient proper publicity to create a demand on the part of citizens,

*Read before the National Malaria Committee (Conference on Malaria), meeting conjointly with the Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

COST DATA, CO-OPERATIVE TOWNS, 1920

State and Town	Area Sq. Miles	Pop. 1920	Total Cost	Cost per Sq. Mile	Cost per Capita	Cost per Acre
Alabama:						
Dothan	4.	10,300	$ 4,796.33	$1,199.00	$ 0.47	
Eufaula	4.	6,257	3,327.90	832.00	0.53	
Demopolis	6.	5,000*	2,696.97	450.00	0.54	
Gantt's Quarry	4.	1,000*	2,092.50	523.00	2.09	
Shelby	4.	1,000*	2,499.15	625.00	2.50	
Mignon	4.	3,500*	1,882.45	470.00	0.54	
Total	26.0	27,057	$ 17,295.30	$ 665.00	$ 0.64	$1.04
Arkansas:						
Eldorado	4.5	5,500	$ 2,355.85	$ 523.00	$ 0.43	
Malvern	3.5	3,864	2,190.00	626.00	0.57	
Searcy	3.	2,865*	1,660.00	553.00	0.58	
Fordyce	4.	2,996	2,778.79	695.00	0.93	
Total	15.0	15,225	$ 8,984.64	$ 598.00	$ 0.59	$0.93
Georgia:						
Cairo	4.	1,908*	$ 999.85	$ 250.00	$ 0.52	
Albany	12.5	11,555*	3,984.36	318.00	0.34	
Thomasville	8.	8,196*	4,452.02	557.00	0.54	
Total	24.5	21,659	$ 9,436.23	$ 386.00	$ 0.44	$0.60
Louisiana:						
Baton Rouge	4.42	21,782	$ 4,775.36	$1,080.00	$ 0.22	
Monroe	8.59	12,675*	9,040.00	1,052.00	0.71	
Bastrop	4.5	1,216*	1,420.00	315.00	1.16	
Total	17.51	35,673	$ 15,235.36	$ 868.00	$ 0.43	$1.35
Mississippi:						
Tupelo	4.	5,055*	$ 3,059.68	$ 765.00	$ 0.61	
Columbus	4.	10,501*	3,412.49	853.00	0.33	
Batesville	1.8	1,050	2,019.09	1,120.00	1.92	
Charleston	2.5	3,007	1,540.26	615.00	0.51	
Coffeeville	1.0	411*	1,088.60	1,089.00	2.64	
Total	13.3	20,024	$ 11,120.12	$ 836.00	$ 0.55	$1.31
North Carolina:						
Greenville	3.2	5,700*	$ 8,972.98	$2,800.00	$ 1.57	
Farmville	2.3	2,100*	4,980.40	2,165.00	2.37	
Goldsboro	5.5	11,300*	10,052.19	1,827.00	0.89	
Total	11.0	19,100	$ 24,005.57	$2,180.00	$ 1.25	$3.41
South Carolina:						
Bamberg	7.	2,211*	$ 29,400.00	$4,200.00	$13.30	$6.56
Chester	8.	5,000*	7,460.77	934.00	1.49	
Hartsville	7.5	3,100*	3,635.77	485.00	1.17	
Total	22.5	10,311	$ 40,496.54	$1,800.00	$ 3.93	$2.81
Tennessee:						
Brownsville	3.8	3,060*	$ 1,850.00	$ 485.00	$ 0.60	
Dyersburg	5.1	6,544*	2,367.00	465.00	0.36	
Total	8.9	9,604	$ 4,217.00	$ 473.00	$ 0.44	$0.74

Texas:						
Alto	4.0	1,081	$ 1,539.56	$ 384.00	$ 1.42	
Athens	4.0	3,704	799.05	200.00	0.22	
Bryan	6.0	6,299*	3,775.00	627.00	0.60	
Calvert	4.	2,099*	1,380.00	345.00	0.66	
Groveton	1.5	1,200*	315.00	210.00	0.26	
Hearne	5.	2,741*	2,250.00	450.00	0.82	
Jacksonville	3.	4,723	1,622.01	541.00	0.34	
Livingston	2.0	1,258	300.00	150.00	0.24	
Navasota	6.	5,060*	3,000.00	500.00	0.59	
Rusk	4.	2,348	1,863.15	466.00	0.80	
Trinity	1.5	1,250*	414.00	276.00	0.33	
S. Groveton	1.5	1,250*	302.56	202.00	0.24	
Rock Creek Lumber Co.	1.	900*	520.00	520.00	0.58	
Cameron	6.	4,290*	889.12	140.00	0.21	
Total	49.5	38,191	$ 18,969.45	$ 383.00	$ 0.50	$0.60
Virginia:						
West Point	0.6	1,635*	$ 3,636.32	$6,050.00	$ 2.22	
Virginia Beach	3.6	840*	2,448.79	679.00	2.90	
Total	4.2	2,475	$ 6,085.11	$1,450.00	$ 2.47	$2.27
Grand totals	192.41	199,319	$155,845.32	$ 808.00	$ 0.78	$1.26

*Approximate cost.
Work at 32 of the 45 towns cost less than $1.00 per capita.

influential organizations and associations of interests, so that specific state appropriations for malaria control may be made available. Other points of importance are:

1. That preliminary surveys for control projects should be made in the late summer or autumn of the year preceding the work when possible.

2. That drainage operations be so planned as to be practically concluded before the mosquito season opens.

3. That the efficiency of the field director can be increased 20 to 50 per cent by his being supplied with suitable transportation.

4. A definite plan should be made by each state health department to take a malaria census the year before control measures are instituted and again directly after the close of the season's operations. Without a relative measure of the results obtained we can not expect the co-operation of the public that will come when they can see an approximate measure of the results obtained at a reasonable cost.

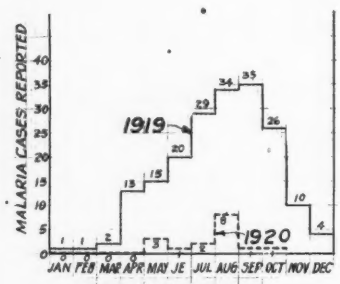
5. There is urgent need of arranging in advance for continuation of work next year and in the future. It is thought that this could be done to best advantage in most communities by training and using the foreman of the malaria control work as a sanitary inspector to be employed the year round. Probably a well-trained inspector will prove to be a better investment for a town than a part-time health officer.

6. In towns where antimalaria work is undertaken the public quickly gets the impression that the scope of the work will be such as to almost eliminate the mosquito pest of previous years, and many persons condemn the work when such results are not achieved. It appears essential to advise the public properly when the work is first started that it will cost the community much more to get a practical freedom of mosquitoes than to eliminate Anopheles only, due to the additional cost of inspecting back yards, etc.

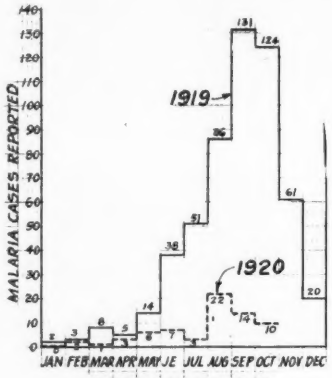
7. As it has been definitely shown that many communities in the states referred to are ready to undertake and pay for protection for malaria, it appears that the state health departments should see to it that the results of this season's successful campaigns in their states and adjacent ones are interestingly brought to the attention of the public, town officials, public-spirited citizens and all persons and associations whose business interest is dependent upon the elimination of malaria.

Attached are some graphs and tables showing results obtained and the cost of malaria control during 1920:

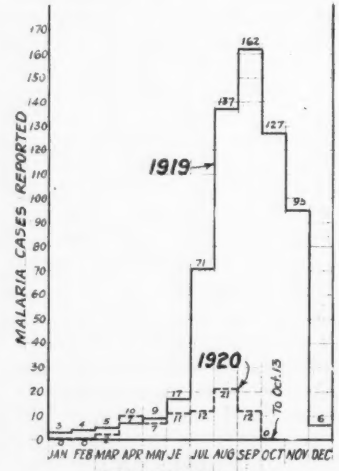
Investigations that have taken place during past years show that our richest farms in the best part of our country are paying anywhere from $2.50 to $10.00 per acre per year as a malaria tax. Now, here are two hundred square miles where the cost per acre was $1.26, which means all the heavy drainage work, so it is not such a big impossible proposition. The drainage necessary for agricultural work is going to be done, and the only drainage that will be necessary for Anopheles control will be the minor drainage. Public sentiment unquestionably is favorable to the control of malaria by drainage on a big scale; and drainage supplemented by fish control and other measures is not only feasible, but it will be done because it is what the people desire.



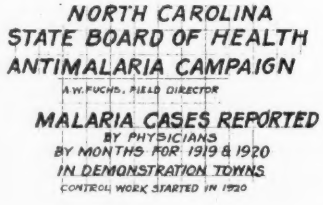
FARMVILLE, N.C.
POPULATION 2100
CASES REPORTED BY 100% OF PHYSICIANS
REDUCTION 91%



GREENVILLE, N.C.
POPULATION 5700
CASES REPORTED BY 73% OF PHYSICIANS
REDUCTION 87%



GOLDSBORO, N.C.
POPULATION 11300
CASES REPORTED BY 67% OF PHYSICIANS
REDUCTION 84%



DISCUSSION

Dr. John A. Ferrell, International Health Board, New York, N. Y.—We are now approaching the close of the first year's co-operative effort in conducting demonstrations of malaria control. The results thus far have been gratifying, and

should be a source of satisfaction to you who have given direction to the work. There has been harmony among the co-operating health agencies, Federal, state, town and International Health Board, at every point, and the incidence of malaria and the prevalence of Anopheles mosquitoes have been definitely reduced at a cost within the economic reach of forty-six towns representing a population of approximately two hundred thousand.

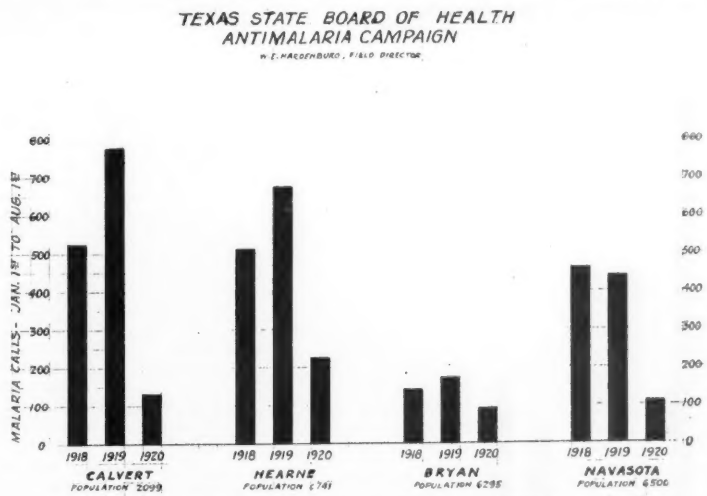
The value of the work accomplished will be negligible, however, if the necessary steps should not be taken to guarantee its maintenance through 1921 and subsequent years. In planning for next year's work, our attention should be given first to the towns worked during the present year. Each town should be committed to making the necessary provision for the maintenance of the anti-mosquito work under the direction of a full-time capable sanitary inspector.

The supervising of the forty-six towns during 1920 required the services of approximately twenty sanitary engineers. If each of the forty-six towns should employ a capable sanitary inspector, a certain part of the time of the sanitary engineers will be required in supplying the necessary supervision. This responsibility should be provided for before making arrangements for the extension of the work to new towns.

If the work is to be greatly extended, the number of sanitary engineers will have to be increased. It will not be feasible for the Public Health Service to supply the increased personnel necessary for such extension unless its appropriation should be considerably increased, because the sanitary engineers now compensated by the International Health Board are being carried temporarily for the Service, with the expectation that as early as practicable they will be transferred to the pay roll of the Service. A rather large increase in appropriation would be necessary to enable the Service to do this, and in addition supply new engineers for the work.

It would seem, therefore, if a large increase in the Federal appropriation should not be secured, it will be necessary for the state boards of health to invest in salary and traveling expenses of sanitary engineers, if the number is to be increased sufficiently to permit any great extension of the work. As 1921 will be a legislative year in most states, it would seem advisable for the states to secure, if possible, an increase in their appropriations for the co-operative demonstrations in malaria work at least sufficient to employ one or more sanitary engineers.

In planning for increased efficiency in control measures, you will doubtless wish to give consideration to improved methods for determining the incidence of malaria. The educational work might be improved; and the appropriations from the towns should, I believe, come from public funds rather than from private subscription. Voluntary subscriptions as a basis for carrying on public health work on a permanent basis are seldom satisfactory, whereas if the cost of the work can be provided for in the budget of a town, there is much greater assurance that the results will be permanent. You no doubt have these points in mind and will give them consideration in formulating your plans for the coming year.



CALLS FOR MALARIA IN 4 DEMONSTRATION TOWNS IN TEXAS
JANUARY 1ST TO AUGUST 1ST 1918, 1919, 1920
CONTROL WORK STARTED IN 1920.

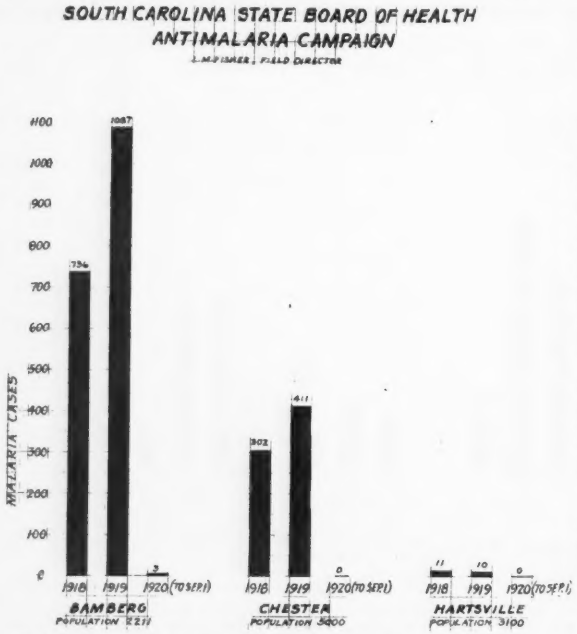
Dr. J. A. Hayne, State Health Officer, Columbia, S. C.—I do not think that any one not living in South Carolina, or the Southern states, can realize at the present time the financial conditions of the South. South Carolina, or at least two-thirds of it, is bankrupt. Never in the history of the State has the State been confronted with the financial conditions that confront it at the present time. If we go before the Legislature and propose that it raise an enormous sum of money under these circumstances, we shall be

flying in the face of Providence. The Legislature will not do it. We may as well realize that as rapidly as possible.

If cotton continues to sell at 17 cents a pound when it costs 25 cents a pound to raise it, and the majority of the money of the State of South Carolina comes from cotton, we are not going to raise any large amount of money in the Legislature this year. I am speaking of South Carolina. I presume the other Southern states are better off.

We succeeded in getting last year an appropriation of ten thousand dollars for this malarial work and we hope and pray that we are going to get ten thousand dollars this year, but that is all. We are not going to get any more.

Last year the appropriation for the State Board of Health was $220,000. That is more than 13.8 per capita in the State, which is more than any other Southern state appropriates for the work, or any Northern one, except Pennsylvania.



MALARIA CASES IN DEMONSTRATION TOWNS IN S.C.

CONTROL WORK STARTED IN 1920

Dr. Graham E. Henson, Jacksonville, Fla.—We are trying to attain a single object, though we are more or less divided as to the manner in which this object may be attained.

Some of us believe that by controlling and eradicating the mosquito we can best control malaria, and some believe that it should be accomplished by the treatment of the infected human being.

I wish to enter my protest against the statement made here this afternoon that quinin is nothing but a makeshift measure. While I am not here to quarrel with the sanitary engineers, it is my opinion that screening is nothing but a makeshift measure.

Let us consider yellow fever on the one hand and malaria on the other. If all our efforts in eradicating and controlling yellow fever had been directed at the mosquito where should we be today?

I think it was the State Health Officer from Alabama who made the statement this morning that the prevailing species of mosquito in certain sections of Alabama were the stegomyia. Does that mean anything? Is anybody worried over the fact that they have thousands or millions of stegomyia in Alabama today? No. Why? Because they have no infected human blood for that mosquito to feed upon.

It seems to me simple that so soon as the human host is sterilized it is immaterial, outside of human comfort, what number of Anopheles are present in a district.

Dr. R. C. Derivaux, Nashville, Tenn.—As Dr. Carter has said, "There is no ideal method of malaria control." Every method has its place, and one must prove a makeshift, while others can be, for some reason or other, permanently applied.

In Nashville, the problem brought up was a big one. Nashville has not been noted for malaria, nor has Davidson County. The vicinity of Nashville, while providing a number of breeding places for Anopheles mosquitoes, among them *quadrimaculatus*, has not been one in which malaria has to any great extent occurred. With the coming of the Powder Plant there, bringing in about thirty-five or forty thousand people, some several thousand of them going back and forth from Nashville in industrial trains, the rest of them living immediately near the plant, and many drawn from other regions in the South in which malaria was highly prevalent, work was begun in the sanitary zone. This was not at the very beginning, but after malaria had been observed in the hospital at the Powder Plant to a rather alarming degree.

Control was secured early enough practically to prevent cases other than relapses and those were carefully gone into. Since the armistice I am happy to say that the city of Nashville has maintained a part of the malaria control work in those parts of the city that are adjacent to breeding grounds for A. quadrimaculatus. During something over a year that my work in Nashville has been of a private nature, I have made just three miscroscopic diagnoses of malaria. I am occasionally asked to examine blood in suspicious cases. Dr. Olin West is my authority for the statement that before the location of the Powder Plant at Nashville malaria, other than imported, was practically unknown. He told me on several occasions that some of the most severe cases of pernicious malaria he had ever seen occurred in medical students who had come there from other sections.

We need continued work on a large scale, regardless of the fact that financial conditions and others in the country are considerably upset at this time. It would be a calamity if much of the

very valuable progress that has been made in the advancement of malaria control were to be allowed to slump in any particular. I don't feel that small differences of opinion ought to be allowed seriously to modify choices of methods and give communities an opportunity to think that the question among experts is unsettled.

I feel, as Dr. Ferrell said, that communities should be pressed definitely to commit themselves to a policy of continuation, in so far as they can and in so far as their local malaria problem would justify them in spending a proportionate part of their available public health moneys.

I do not know that I quite agree with the analogy of malaria and yellow fever that Dr. Henson just brought out with reference to quinin. My preference would be decidedly in favor of mosquito reduction measures by engineering methods rather than through the very uncertain means of human attack. Yellow fever is an acute, dramatic, intense affair which is only communicable to a mosquito host—or to the insect host put it, rather, during the first few days. In malaria, the thing is quite the reverse. It is insidious and people are used to it. They will not be frightened about it. It is very difficult to get up very much enthusiasm, as many of you have discovered who have tried it before audiences accustomed to malaria from childhood. The talk is very interesting, etc., but it does not frighten them; whereas, on the other hand, the mere words "yellow fever" do.

I should put engineering measures, oil, drainage, supplemented by screening, certainly in the first class. My own practice is to ask physicians to be as conscientious as they can, first in their diagnosis and then in the treatment of known cases until they are satisfied, or are strongly of the opinion, that they are sterilized as far as the public welfare is concerned.

Dr. A. P. Harrison, State Board of Health, Austin, Tex.—We realized about a year ago that we had a very grave problem in the prevalence of malaria in Texas. You are all familiar with the size of Texas. About one hundred and five counties are distinctly in what is known as the malaria belt of the State. From available data we have figured that we have about eighty thousand cases of malaria in Texas every season. That points out the gravity of the situation.

The first Federal work in the attempt to control malaria in Texas was originated and put into execution about a year ago. Unfortunately, we found ourselves in the position of most of the other states, without available funds from the State Board of Health to finance the work. The Public Health Service and the International Health Board came to our rescue and through their assistance we instituted this work. Three different units were organized and put in charge of three sanitary engineers, under the general direction of the co-operating agencies.

We followed the general plan of attempting to do away with the breeding places of the mosquitoes, the usual methods of drainage, of oiling, of filling and practically all the methods of malaria control. I may say that we carried out, so far as was possible for us, the general plan that Dr. Taylor used in his work in Arkansas. The demonstration has been up to the present time so conclusive that it has aroused a tremendous amount of interest throughout the State in malaria work. The State Health Department is deluged with requests from towns to institute this work, and in formulating our plan for the coming year's work we have prepared a bill to introduce before the Legislature asking for an emergency appropriation of $56,000. We hope to have, to a certain extent, the continuation of the assistance from the International Health Board and from the Public Health Service. We are hoping to have the towns to a very great extent finance the work, outside of the supervision of the work which we plan to furnish them.

We have found that our great problem is not simply the control of malaria in the towns, but some effective method of control in the rural districts. There appeared to be a very much heavier incidence of malaria in the county than in the towns, and, of course, the county infects the towns. That is one phase of the subject that we in Texas should like very much to have suggestions on, and should like very much indeed to hear discussed at some time during this meeting.

Dr. S. W. Welch, State Health Officer, Montgomery, Ala.—We ought to adopt a definite policy. A change of policy in Alabama now would not be conducive to good work. The work which has already been done has, in some instances, been spectacular in its results. And we are like the gentleman from Texas. We shall have all the work that we can do in other towns than the ones which have already been worked. We anticipate no trouble whatever in having the work carried on in the towns which we have worked. For instance, Mr. E. P. Johnson, Sanitary Engineer, received this letter: "We wish to say something commendatory of the work in Alabama. When first the work was started there was a little doubt as to the possibilities of its benefits." That is true. "From reports we have from physicians and drug stores, we are convinced that the work has been a decided benefit; in fact, the malaria in this community has been reduced to a minimum—practically none in the area affected by the control work. We are planning to continue the work, and if possible extend its scope through the next year. Yours very truly, J. I. Lee, Mayor."

All of the work undertaken in Alabama has been by municipal agency—not by voluntary contributions. In this particular county we are undertaking to work the entire county by an appropriation by the commissioners' court of the county, employing a sanitary inspector who will do the work in all of the municipalities and as many of the rural sections of the county as can be operated. We are projecting some work in the other counties in which we have worked, putting on a sanitary inspector for the county as a whole.

We worked eleven towns in Alabama this year, seven under the co-operative plan and four that took on the work as the result of what they had heard was being done in other places. All of that work, I have no doubt, will be carried on during the coming season. In one of the towns there was a lake of eighty-seven acres that had been a nuisance to the community for a number

of years. It was said to be impossible to drain it. It was drained by the sanitary engineer. With the mosquitoes we got two alligators six feet long and a wagon load of water moccasins.

Dr. Frederick L. Hoffman, Statistician, the Prudential Insurance Company, Newark, N. J.—I had hoped that something would be said with regard to the theory held by Dr. Campbell, of San Antonio, that the domestic bat can be utilized as a means of mosquito extermination and malaria control. I have discussed this question with Dr. Campbell himself and I have personally tried to understand the merits of his suggestions, but I am afraid that Dr. Campbell fails in appreciating the true nature of scientific evidence. He, however, fortifies his arguments with a mass of resolutions and letters of approval which apparently sustain his conclusions and give the sanction of the State of Texas and the local medical society to his views. Personally, I am not at all convinced that bat roosts are a solution of the problem even under the best possible conditions, aside from the certainty that the vast number of bats required would in course of time constitute a most serious nuisance to the community, though, of course, possibly without being a further menace to health. This much, however, may be said without fear of contradiction: that the only statistics available for the city of San Antonio indicate an increase in malaria rather than a diminution in the frequency of the disease. Other communities are being induced to adopt the bat roosts and possibly considerable expense may be incurred which would not be justified unless more evidence is forthcoming that the experiment is deserving of public consideration.

Dr. Campbell is unquestionably entirely disinterested in this matter and sincerely believes that he has found a solution where other men have failed. The Public Health Service, the Army authorities, the Bureau of Entomology and the Bureau of Biological Survey have all considered the question, but none has made an investigation of sufficient extent and thoroughness to put an end to an agitation which must produce much mischief if, upon inquiry, the conclusions should be found contrary to the assertions that are being made. It, therefore, seems to me a foregone conclusion that sooner or later the Public Health Service, in co-operation with other scientific departments of the Government, will have to consider this question and report upon the whole subject in a final form.

The Malaria Committee is expected to render a larger service than the holding of an annual conference and the reading of a few papers, however admirably presented. It must become an active body concerned on the one hand with research and on the other with educational propaganda to arouse an active interest on the part of the medical profession, the local authorities, and the people themselves. No preventible disease offers greater possibilities in this direction than malaria. From a scientific point of view an immense amount of work requires to be done before any single conclusion can be accepted as absolutely final. As regards the practical results, there can not be the slightest question of doubt that malaria at the present time is a most serious hindrance to the highest development of agricultural production, not only in the Southern states, but also in the Sacramento Valley and in other sections of the country. I should have liked to speak of the demonstration of the work which is being done at Mound, La., through the co-operation of the United States Bureau of Entomology under Captain Van Dine, the International Health Board under Dr. Rose, and the plantation interests concerned under Mr. G. S. Jurger. I know of no field offering greater practical possibilities than this, where malaria frequency, mosquito density and agricultural production are intelligently investigated toward the one objective of ascertaining the true cost of malaria to Southern agriculture, or at least to plantation interests in the whole South. I am, therefore, very glad to know that Captain Van Dine, who has charge of the Mound investigation in behalf of the United States Bureau of Entomology under Dr. L. O. Howard, is here to present at least an outline of the work that has thus far been done.

Dr. L. D. Fricks, Surgeon, U. S. Public Health Service, Memphis, Tenn.—I should like to say for the information of the National Malaria Committee, not by way of argument with Dr. Hoffman at all, that this matter was referred some time ago to the proper authorities, and a report upon it was made by Dr. L. O. Howard, Chief of the Bureau of Entomology. The matter was recently brought up again and was referred to me for comment by the Surgeon-General of the Public Health Service. I took the position, which seemed to me to be right and proper, that since the Bureau of Entomology had reported on the matter of employing bats and establishing bat roosts as a means of combating mosquitoes, the Public Health Service could not afford to reopen this discussion.

Dr. Henson.—May I ask if these reports are published and available?

Dr. Fricks.—Yes.

Dr. Hoffman.—The report by Dr. Howard was made, I think, some six or seven years ago. It was a rather brief discussion and not sufficiently amplified by the evidence required. The conclusions no doubt were based upon a much larger knowledge of the subject than is implied and they may safely be accepted as trustworthy, for no one enjoys a higher reputation for fairness and scientific accuracy than the Chief of the U. S. Bureau of Entomology. For the needs of the larger public, however, a much more extended inquiry is required, and such an investigation should be made in co-operation with the U. S. Biological Survey, so that every reasonable question of doubt may be set aside. It is conceivable that bat roosts may be of advantage in one location, while entirely useless in another. It is possible that bats may exterminate a sufficient number of Anopheles to reduce the mosquito nuisance to a minimum. Conversely, the enormous number of bats required for effective work may constitute an evil of itself not to be tolerated in civilized communities. The subject has reached the stage where, in my judgment, it is obviously the duty of the several Government departments concerned to institute a thorough investigation and to make a full report.

Mr. Frank R. Shaw, Assistant Sanitary Engineer, U. S. Public Health Service, New Orleans, La.—I should not look forward to supervising another campaign where popular subscription was the only source of local funds. But our work is to prove the possibility of malaria control and mosquito eradication and in some cases it might be necessary to alter the usual plan. A campaign accomplishing results against adverse conditions, such as popular subscription difficulties, might become more permanently established than one conducted exactly according to form.

The Service supervised an initial campaign in a certain state capital in 1919 for which the funds were provided by popular subscription. The funds were not sufficient to go into the general mosquito breeding phase, but a very marked reduction in malaria was accomplished. This season the co-operative plan was in effect, but again local funds could only be provided by popular subscription. Although the work was started with only one-half of the amount called for in the original estimate, the local fund was gradually increased and ultimately very satisfactory results were accomplished.

Most communities are in need of educational work. They want it. In this particular case, by continuing the work the second year, it was possible to take advantage of what was done the first year, improve and extend it, and thus accomplish increased reduction of malaria and very satisfactory mosquito eradication. Had we not prevailed upon the people to provide money and rendered the assistance necessary, the effect of the first year's work would have been lost and the initial demonstration detrimental rather than beneficial in furthering anti-malaria operations. The most important effect of the second year's campaign was that of changing the entire attitude of the city government from a skeptical to an enthusiastically favorable one and in developing the interest of the people as a whole.

I must admit that very little publicity was given the work, for most of the time was occupied in getting the money and in effecting the greatest economy, but the mosquito nuisance was greatly relieved and thus the campaign produced its own publicity.

Whereas there is assurance that a strong demand has been created, the municipality's financial condition indicates the necessity of continuing the work on a popular subscription basis for one or more years in the future. By conducting the second year's campaign on a most irregular plan and on the face of it, a very unsound basis, we have accomplished the very purpose of our organization.

Mr. L. M. Fisher, Associate Sanitary Engineer, U. S. Public Health Service, Columbia, S. C.—We have demonstrated in South Carolina, for instance, in one town with a population of twenty-two hundred people, that it paid to expend $22,000 to do the work. We selected this place because of its difficulty.

Our biggest problem is to raise the money. This scheme may be highly visionary, but I really think it has value: some individuals or corporations in the South should raise a fund to be used in educational work, or propaganda, say of about one hundred or two hundred thousand dollars. We should spend a year or two years in collecting our information, be thoroughly prepared to supply chambers of commerce and the public and industries and everybody with the information that we have, and then proceed to collect a large fund which could be used in permanent relief work throughout the South, a fund which should run into perhaps a hundred million or more. We send millions and millions across the sea to people who apparently have not sense enough to stop fighting. That is the humanitarian standpoint. It would have an appeal to a large number of people. In addition to that it would have a tremendous appeal to business men if we could get to them the fact that the control of malaria is an important factor in increasing profits, and that it would benefit business men in the North as well as business men in the South.

Dr. C. W. Garrison, State Health Officer, Little Rock, Ark.—The one thing that has restricted the extension of this work more than any other is the lack of trained supervisors. It is better, in my judgment, to hold the units already established than to create new ones and let the old ones lapse. We must continue to supervise the old units which we have created and gradually extend the work. We can not do this without trained supervision.

Some gentleman made the remark that about 90 per cent of the work of the field directors should be head work and 10 per cent foot work. My experience and observation has been that unless he uses about 100 per cent head work and an equal amount of foot work his supervision can not be successful. This summer one of our field directors was taken ill for just a few weeks. Upon investigation it was found that the work was not continuing satisfactorily and the citizens were becoming dissatisfied. In another case, one of the directors was detailed to other fields. Some of the old towns lacked constant supervision and they had the same experience and there was severe criticism.

We have asked all the co-operating agencies to extend our program for the next year. We have had a number of requests from new communities for supervision. We have already made some of our surveys, but unless we can be assured of a markedly increased personnel it seems to me it would be dangerous business to undertake to extend our field of operation next year.

The question has been raised about committing the towns to an agreement. Most of our old towns were committed last year, but there were changes in administration and the agreement was nullified. We find that unless there is leadership in a given community, and constant supervision by a trained man, any agreement without the cash amounts to but little. I hope I am wrong, but my opinion is that as long as we have malaria and Anopheles we are going to have to supervise each unit every season. That simply means that we are going to have to increase our personnel, and only in direct proportion to the increase in personnel can the area be safely extended. And our good directors, we have found in the past, were

soon taken over by some one who could pay them higher wages than we could.

As to raising funds, if it is to be based upon appropriations by the state, I fear our work is already closed in Arkansas. In many of our little towns the cost of control measures is equal to the entire revenue of the towns. We have very little prospect under these conditions of raising sufficient funds by appropriation. It must be supplemented by subscription.

There is one other agency which, I believe, has not been mentioned, which I think can be utilized to a very great advantage, and that is the railroads. The Cotton Belt in Arkansas is doing a very great work, and I think the reason some other railroads have not contributed more is that we have not approached them in the proper manner. In all the towns where we have operated this year the railroads have agreed to do their part in controlling their right of way. One of the engineers detailed to Arkansas has a paper in regard to co-operating agencies, so far as engineers are concerned, and he has some valuable suggestions to make.

Mr. LePrince (*closing*).—I had a very interesting experience in dealing with the question of financing. I went from one town to another, week after week, and found that the average town in the South and the North is without funds. The state health departments appeared to be in about the same condition; but even so, I am not discouraged. I do not believe enough has been done toward letting the public know what we are driving at. The American people are very slow to make up their minds about what they want, but when they have made up their minds they are going to get it. We must devise a means of getting the public to want and insist upon having this malaria work done.

I suggest that we get up some effective antimalaria propaganda. One or two of the states have started with some short moving picture films. Probably within a year or two three or four of the states will get up similar propaganda. Would not it be better for all the state health officers in the twelve or thirteen states involved in this question of malaria control to get together and produce a really good film, something that would go not only to the people but beyond them to the legislatures and help us get the money that we need? It is a state proposition, and ultimately all the funds for this work should come from the state. Each state should have its own malaria division.

In fighting the Anopheles we have found it is absolutely essential to get rid of the mosquito nuisance. The public does not believe so much in malaria control as in getting rid of the mosquitoes. They have found out that you can get rid of the mosquito pest and they are willing to pay for that and they insist on having it.

There is a way of getting the people of most of the states in the malaria belt to want the malarial sections of their country freed from malaria so that funds will be forthcoming, and there is going to be some hard work done along that line in order to bring it about. Of course the sooner it comes, the quicker we shall get malaria control.

SURGERY

RAILWAY, INDUSTRIAL, GYNECOLOGICAL, OBSTETRICAL AND UROLOGICAL

POST-OPERATIVE THROMBOPHLEBITIS*

BY FRANK K. BOLAND, M.D.,
Atlanta, Ga.

The careful surgeon will always admit to his patient that no operative procedure, no matter how trivial apparently, is absolutely void of danger. With our almost perfect methods of anesthesia and asepsis, and with the increased knowledge which guides us in the better selection of surgical risks, it is true that in deliberate cases we generally may assure the patient of a satisfactory immediate result, however unsuccessful the end-result may be.

Even in immediate results, however, and in well-chosen cases, we must be prepared at any time for embarrassing, if not dangerous, complications. The writer has seen two so-called clean operations result in death within forty-eight hours from streptococcic septicemia introduced no one knows where nor how. A clean case of femoral hernia succumbed to tetanus one week after operation and the origin of the infection was a matter of guesswork. Unanticipated tragedies have been recorded from hemorrhage, shock, acidosis, acute dilatation of the heart and of the stomach. Thorough preliminary study and preparation of our cases will reduce post-operative complications to a minimum. Constant vigilance must be exercised to see that our regular routine of examination and preparation is always carried out, while the aseptic conscience must ever be kept awake.

This paper is a reminder of a post-operative result, thrombophlebitis, which occurs with comparative rarity, but which has been reported by the best men working in the most auspicious surroundings. To have veins infected from a septic field, as phlegmasia alba dolens accompanies puerperal sepsis, cannot be surprising, but to see the condition follow a clean operation faultlessly performed, is something difficult to explain. The writer regrets to admit that he has no explanations to offer at this time which have not been given already. Only a brief discussion of the subject is offered, following a review of the literature, with the hope that interest may be aroused which will result in more fruitful investigation. It has been said that surgical morbidity does more to bring surgery into disrepute among the laity than does surgical fatality. The living patient with his bad result is a constant and prominent memorial in the community, while the surgical fatality is buried and forgotten.

No doubt it is true that a great many of our so-called "clean" operations are not absolutely aseptic. Is it possible to maintain perfect technic in cutting through the lumen of an appendix? Burning it through with the cautery seems safer. A large percentage of case of thrombophlebitis follow pelvic and rectal operations. It is easy to see how the field may become contaminated in cutting into the vagina or in handling an infected Fallopian tube.

Beckman[1] reported 16 cases of thrombophlebitis in 5,835 operations done at the Mayos'. In a series of 3,000 operations, Clark[2] of Philadelphia found 35 cases.

Hampton and Wharton[3] report 205 cases in 21,000 gynecological operations performed in the Johns Hopkins Clinic, about 1 per cent. Other writers assert that the disease occurs in from 1 to 4 per cent of all laparotomies. The writer has had four mild cases complicating "clean" laparotomies and one severe case and death following debridement and secondary closure of a gunshot wound of the

*Read in Section on Surgery, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

popliteal space. More than one-half of all the recorded cases are sequels of operations of the so-called "clean" type.

The earliest onset of thrombophlebitis is four days after the operation, and the latest onset is four weeks. Nearly every vein in the body, superficial and deep, has been affected, but those of the lower extremity are affected most frequently. The veins of the left lower extremity are involved three times as often as those of the right, the reasons given therefor being that the right common iliac artery crosses the left common iliac vein, causing a slight obstruction; and that an overloaded colon tends to obstruct the left vein. Frequent enemas after operation, causing pressure from the sigmoid, is given as another cause of the more common involvement of the left side.

The Mayos think the recumbent position in bed for too long a time after operation, producing retardation of the blood stream, is a predisposing factor in the etiology of the disease. For this reason it is recommended that patients be allowed to sit up and move about earlier. At the same time it is granted that if a patient already has developed a thrombus in some vein, getting up is about the worst thing he could do, since the chances of embolism are much increased thereby. Do we always recognize thrombophlebitis in its incipiency? The average case presents a well-known clinical picture, but many cases develop insiduously, without the usual symptoms. Therefore, it seems that getting our patients out early might not be such good advice, notwithstanding the approval of such high authority.

From an exhaustive study of their series of 205 cases, Hampton and Wharton believe that thorough observation of cases of thrombophlebitis will show that practically none of them has an absolutely normal convalescence up to the onset of the disease. Their patients showed a definite, low, persisting pyrexia from shortly after the time of operation until the onset of pain and swelling of the leg during a period when the temperature clearly should be normal. Kuster failed to notice this premonitory rise of temperature, while Fromme thinks that many slight elevations may be overlooked, and moreover that infection may occur without febrile reaction being present. Michaelis[4] agrees with the conclusions of Hampton and Wharton to such an extent that he states that in patients who have a perfectly normal temperature curve after operation, thrombosis and embolism do not need to be feared. If this be true we should always know when it is safe to allow a patient to be out of bed. As contradictory evidence to this idea, in two abdominal cases seen recently by the writer, one ran a normal temperature up to the time of the appearance of symptoms of phlebitis, while the other one had a slight rise of temperature during the same period, although the wound apparently was perfectly clean.

To other causes for thrombosis following laparotomies Albanus[5] adds heart derangements, pressure of tumors on veins, cooling and handling of blood vessels while the abdomen is open, the effect of narcosis on the heart and the pressure of a bandage. Destruction of corpuscles from toxic substances in the blood is assigned as another cause. Clark believes that rough handling of retractors is an etiological agent in thrombophlebitis. We have all seen the peritoneum stripped from the abdominal wall by the careless use of retractors. The epigastric vessels may be injured in this way. However, McLean,[6] from his experiments on dogs, declares that such damage to veins will not cause thrombosis. He believes that necrosis of tissue in stumps distal to ligature plays an important part in the etiology.

McCann, of England,[7] holds that transfixion of a vascular area, such as the omentum or the broad ligaments, is an influential cause of thrombosis. By transfixion vessels may be punctured and bleed either externally or into the tissues. In tying the transfixion ligature it may be that a portion of it remains in the lumen of the vessel. If this ligature is of doubtful asepticity, or becomes subsequently infected, the natural process of clotting in the vessel may become arrested, the clot liquifying and becoming detached in pieces or in its entirety. If care is taken always to pass the transfixion needle through an avascular area, bleeding and clotting will not occur. McCann urges that round-edged needles, and never one with sharp edges, be employed for this purpose. To

minimize trauma and hemorrhage, round-edged needles are to be preferred for all purposes. In the skin it is necessary to use needles with cutting edges.

Debilitated and anemic subjects, those who recently have lost much blood, or those who have undergone a prolonged operation are predisposed to thrombophlebitis. Bartlett[8] states that varicose veins are important predisposing causes of the condition, especially varicosities of veins which are directly affected by the operation.

Pathologists are agreed that the blood-platelets are the originators of the typical thrombus, and that injury of the endothelial lining of the blood vessel precedes the formation. According to Bizzero, platelets are present from 180,000 to 780,000 per cm. in normal blood. They may collect around a foreign body, such as a fragment of catgut, or following a slowing of the blood stream, collect upon the damaged wall of a vessel. No doubt in different cases different elements or different combinations produce endothelial injury; in some, traumatism; in others, toxins; but in the vast majority, actual bacterial invasion. Baumgarten has shown that the agglutinative process takes place only in circulating blood, for there is no thrombus formation when a vein is doubly ligated and excised. Succeeding the collection of blood-platelets there is a rapid accumulation of polymorphonuclear leucocytes, to which the addition of fibrin and red cells completes the thrombus.

Of the symptoms, pain is almost always the first complaint of the patient, and usually is the first symptom explanatory of the low fever. In rare cases tenderness may be present along the course of the femoral vein before onset of pain. Swelling soon follows pain and may be marked. Redness over the course of the vein is unusual; the limb occasionally becomes cyanotic. The temperature does not rise decidedly until the initial symptom of pain has become evident.

The ordinary case of post-operative phlebitis of the veins of the lower extremity will require the patient to remain in bed about twice as long as is customary after a laparotomy. Swelling is the last sign to disappear, and it may persist for many months. In a case of the writer's, swelling was present for one year.

Thrombosis of the mesenteric and portal veins present clinical entities which will not be discussed here. The most serious complications of thrombophlebitis are pulmonary. Hampton and Wharton, in their recent excellent article on the subject, say that 7 per cent of their cases developed pulmonary infarcts, and 1.5 per cent developed pulmonary embolism. One case in each series died. Thrombosis of the abdominal or pelvis veins is far more liable to result in these dangerous sequelæ than thrombosis of the veins of the leg, especially when the latter is accompanied by pain and swelling. Fatal embolism attributed to thrombosis of the femoral and saphenous veins, however, is not unknown. The diagnosis of pulmonary infarction, a much commoner affection than embolism, though not nearly so fatal, is frequently overlooked. From a study of 40 cases diagnosed as post-operative pleurisy, 80 cases diagnosed as post-operative pneumonia, and 50 cases diagnosed as post-operative bronchitis, Hampton and Wharton decided that 34 were undoubted cases of post-operative pulmonary infarction.

The treatment of thrombophlebitis consists in rest, elevation of the part, and the application of cold during the acute stage, and heat afterward. Opium is often necessary to relieve pain, although the writer finds that the administration of such a drug as aspirin in five-grain doses every four hours not only seems sufficient to give the patient comfort, but also lowers the temperature, causes profuse diaphoresis, and apparently shortens the course of the disease. It is well for nurses to know that post-operative pain in the legs should not be subjected to massage until the cause of the pain is known. Such well-intended, but misdirected, treatment may produce pulmonary embolism.

As Binnie says of ventral hernia, the best treatment of post-operative phlebitis is not to have it. While it has been shown that the complication will occur in spite of irreproachable surgery, a consideration of its etiology must suggest that the incidence of the disease might be reduced by closer attention to the details of the operation, which means sharp, clean dissec-

tions, the gentler handling of tissues, and always striving for an improved aseptic technic.

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DISCUSSION

Dr. Charles E. Dowman, Atlanta, Ga.—Dr. Boland has so thoroughly discussed the question of thrombophlebitis that there is really very little to add. The various points which I had in mind were fully covered by him. Personally, I have had very little experience with post-operative thrombophlebitis, having had one case only. This case conformed to the description furnished by Dr. Boland. This was an interesting case because of a paralysis of the left external popliteal nerve which developed immediately after a uterine suspension operation. I suppose this was caused by pressure during the time when the Trendelenburg position was maintained. Four or five days later she developed a thrombus of the femoral vein on the same side.

I think it is a generally accepted view that the endothelial cells of the vein must be injured in order to have thrombosis. Whether this is due to trauma during the operation—actual handling of the vein or accidental crushing of the wall—or whether to some other agent, such as infection, it is of course difficult to say. The fact that these patients run a temperature would indicate that infection is largely responsible.

One point that Dr. Boland mentioned but did not stress I would like to emphasize. All nurses are, very naturally, anxious to keep their patients comfortable. If a patient complains of legache or backache, she invariably wishes the nurse to rub the painful area. I think it would be a good idea if all hospitals would have a standing order that no nurse should massage a painful area until the condition has first been diagnosed. Dr. Sachs told me this morning of a patient who complained of a pain in the groin. The nurse was asked to relieve it by rubbing; the thrombus was loosened and the patient died immediately of pulmonary embolism. I think we should all keep this point in mind.

Dr. Edward G. Jones, Atlanta, Ga.—The thing that interests us more than any other is the actual etiology of the phlebitis; and so far as I know no entirely explanatory explanation has yet been offered. What Dr. Boland says about the treatment—the best treatment being not to have it—reminds one of the observations of Sir James McKenzie in his treatise on "The Future of Medicine," wherein he elaborates his theme upon the following basis: the real function of the profession is the prevention of disease; whereas, as a matter of fact, we have approached the subject from the opposite end of the story; and the most we know about morbidity and mortality is what we have gathered from the laboratory and from the autopsy room. So what we most need is the discovery of some means whereby we can recognize the preliminary stages of disease of all kinds.

Dr. A. L. Blesh, Oklahoma City, Okla.—The Doctor has really touched upon a timely topic. Its oldness does not make it any the less interesting or distressing. The statistics as to frequency of this complication which the essayist has quoted are very accurate and in accord with our experience in some ten thousand surgical cases.

The etiology seems to me to be undoubtedly septic, no matter whether the operation is aseptic or not. Of course our most aseptic operations are only approximately so. Absolute asepsis is attainable only in the test tube. In all likelihood the process in the vein is metastatic. A case now in the hospital illustrates this point well. Following a perfectly clean operation, after the incision had healed, a pleurisy developed, and a week later a right thrombophlebitis of the right leg. A week later still, the same process in the left leg. There is one thing that our work has emphasized and that is that it is more apt to occur when the work involves the retro-peritoneal cellular tissue, as, for instance, in a retrocecal appendix. In a measure the peritoneal membrane acts as a protection. The degree of sepsis in the case seems to have no direct influence in the causation. It seems that in the more septic cases Nature has built up her antibodies to a higher degree of protection. Cases of only moderate infection are at least as apt, and I rather think more apt, to develop this condition than are those of the more severe type.

Dr. R. L. Sanders, Memphis, Tenn.—I just want to say concerning the frequency of thrombophlebitis with reference to the operation that while it is a fact that operations about the pelvic zone will more frequently develop this condition, we do observe quite a large number of cases in connection with the upper abdomen. In connection with a large clinic we have found quite a number of cases where the upper abdomen had been invaded as well as the lower. This conforms to the point Dr. Blesh just brought out about its being metastatic, and in that way it is just as likely to come from one part of the body as the other. I remember quite a number of gall-bladder cases in which there was thrombophlebitis of the left leg, and frequently bilateral.

As to treatment, which Dr. Boland did not bring out, one thing is how long these patients should be kept down. They should be kept quietly in bed for a given time, but how long is that given time? In a series of cases we found that it was entirely safe, no bad results following or embolism following, after the temperature had become normal to allow them to be up. This may be five days, or perhaps ten, but after the temperature subsides there is no danger. Let the temperature be your guide and do not keep the patients in bed too long. I think this will not result in an embolism. I just wished to mention this point as to how long they should be kept down.

Dr. Boland (closing).—Carrying out the idea of Dr. Blesh that the thrombophlebitis is metastatic in origin, I recall that DaCosta reported a case where this condition followed a breast amputation.

I think I have nothing more to add, but thank the gentlemen very much for their discussion.

TRANSPLANTATION OF CARTILAGE*

By W. T. Coughlin, M.D., F.A.C.S.,
St. Louis, Mo.

The past twenty years has witnessed an awakening of interest in the transplantation of normal tissues of the body and our knowledge and skill in this department of surgery have made unprecedented progress.

Experimental research has shown that practically all the body tissues and sometimes even whole organs can be successfully removed from their normal habitat and under favorable conditions as successfully reimplanted in other parts of the body, often without change either in their form or function, and surgery has been quick to profit by the work done in the laboratory.

It is only in the past eight years and more particularly in the last four that very much attention has been given to the transplantation of cartilage. At Cecis' Clinic in Pisa, Italy, during the Turco-Italian War, the process came first prominently into notice.

In war wounds of the face, where loss of the underlying hard parts rendered the deformity more pronounced, resort was had to cartilage implantation for the purpose of overcoming the skeletal defects.

Morestin, of Paris, claimed that he had been using the method for similar purposes for over twenty years, but it was not until the recent war that much notice was given to it in France or elsewhere. It is to Morestin undoubtedly that we are most indebted for its now widespread use. His brilliant and well published experiences have been very largely responsible for exciting genuine surgical interest in the process.

Cartilage lends itself most readily to transplantation. It is easy of access. The supply furnished by the individual himself is practically unlimited. Its removal does not impair his function nor leave disfiguring or mayhap dangerous scar or deformity. It is easily worked into the desired form. It requires no elaborate mechanical device for its removal or reimbedding and as far as we are yet able to determine, it continues to live and retain its shape and size, and lastly, it must be mentioned that it is not so susceptible to the action of pyogenic organisms as are other grafts. It often heals in firmly, even after prolonged suppuration of the wound.

As with the other tissues of the body, grafts of cartilage grow best when taken from the patient himself, although those taken from others of the same species in the great majority of cases survive and endure.

Heteroplastic grafts do not long survive, but are absorbed and their place is taken by scar tissue. This has been shown by Imbert and others.

A great deal has been said about the periosteum of transplanted bone. Nothing approaching such discussion is likely to take place regarding the perichondrium in transplanted cartilage. J. S. Davis, in a series of experiments, concluded that even without any perichondrium the graft remained unabsorbed. I have a case in which three small pieces of cartilage were transplanted into the skin of the forehead three years ago. They are still there as large as when first inserted. One has no perichondrium and two have it on one side.

Bone requires, when transplanted, to be placed in contact with living bone and to be made to functionate, otherwise it is either absorbed or atrophies. Cartilage, imbedded anywhere in the tissues, retains its form and strength apparently indefinitely, unless subjected to greater stress of weight than that which it formerly carried.

I have observed a case in which three years ago I transplanted a costal cartilage for saddle nose according to the method, I think, of Skillern. At present it seems to me the cartilage is not so thick as it was at first.

My greatest satisfaction has been derived from its use in the upper part of the face and head. But as its function in the facial repair is merely that of filling up bony depressions for cosmetic effect, chiefly its greatest real benefit in my hands

*Read in Section on Surgery, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

has been its protective action in repairing bony losses in the skull.

In France, following the lead of Morestin, almost all the surgeons incline very favorably toward its use for this purpose and the method illustrated here is that which I saw both in Morestin's and Chutro's clinics.

For transplantation into the skull in cranioplasty one should be certain to have the transplanted portion thick enough. A thin piece can not afford very much protection. I remove the whole thickness of a costal cartilage as long as is necessary and then I split it in coronal plane into two halves. I never try to remove the perichondrium, but to remove the cartilage with its perichondrium intact. This is not because I fear that the graft will not grow without its perichondrium, but because when split the piece curves with its perichondral surface concave. It does this better when the perichondrium is attached. This curving is often of advantage, always so in cranioplasty, for then the concave surface is placed toward the brain and so the cartilage conforms more to the contour of the skull.

There has never been any accident in getting the cartilage, either with bleeding or opening of the pleura or suppuration, or lung or chest complications.

The patient never is obliged to stay in bed because of the chest wound. In fact, in all the cases in which I have obtained it for purpose other than cranioplasty, the patient was not confined to bed at all.

When cartilage is used for cranioplasty it is to be remembered that the cartilage rests on the outer aspect of the skull. The periosteum is reflected back for a half an inch all around the margin and the pieces are beveled at the expense of their outer surfaces and fastened to the periosteum with catgut. The periosteal flap is thus sutured on to the outer aspect of the cartilage.

It has been said that the cartilage unites with the bone as it does in life. I have not seen this occur, but I have elsewhere found the cartilage firmly adherent through fibrous tissue. I have never known a piece of cartilage to slip from its moorings nor to fracture.

I have never drained after a transplantation, but I always establish as nearly perfect hemostasis as I can, and only the minimal amount of ligature and suture material and that always quickly absorbable, is buried in the wound.

Around the mouth, nose and eyes suppuration is very hard to avoid, and in using free bone grafts aseptic healing is almost imperative. With free cartilage, however, my experience is in accord with that of many others. Even though the wound suppurates, free pieces of cartilage often surprisingly large, heal in the course of five to eight weeks if good drainage is maintained.

I have not used it to take the place of a loss of an entire segment of the lower jaw. Morestin at first claimed success with cartilage in overcoming such defects. He later, however, was not overenthusiastic for it. Almost everywhere else about the head I have used it always with the greatest satisfaction.

DISCUSSION

Dr. Thomas C. Davidson, Atlanta, Ga.—The Doctor is to be complimented and criticised for his paper, and I shall take the privilege of doing both. In the first place, I do not think that cartilage is an ideal tissue for repairing tissue in the cranium when we have such excellent material as the osteoperiosteal tissue to use for repairing these defects. The cartilage may repair the defect, but it is not bone. It is cartilage after all.

We do know that we can get an osteoperiosteal graft from the cranium or from the tibia in sufficient quantity by taking off the periosteum and a very small amount of bone tissue, and by suturing this over the defect we get a real repair which is permanent. The cartilage does not give much protection. I have had considerable experience in cartilage grafting in face work and plastic work on the boys overseas and in the hospital in Washington, where I was for five months, and we found that the autogenous graft was best, that substances taken from other patients did not last. We found that the cartilage must be in contact with live bone. If it is not it will last only a short time.

I remember one boy who came back who had had some repair work with cartilage and it had not lasted. His nose had been shot away and the cartilage which had been used to repair the defect had been completely absorbed in six months. Whenever we took cartilage from the rib and put it into the nose or face we were particular to put it in contact with live bone, and we had no trouble whatever. The perichondrium is not necessary and in removing the cartilage from the ribs the perichondrium was left. In the osteoperiosteal work we got good results which were permanent. I do not believe that cartilage will replace bone, although it may give temporary bridge work.

Dr. Fred L. Koontz, Louisville, Ky.—I should like to know what the Doctor's experience is in regard to incision in the cartilagious transplants to the bridge of the nose, where he makes the incision, and also how he takes care of the pug nose effect in these saddle-nose cases; how he turns them down and what principle he depends upon to overcome that defect.

Dr. Coughlin (closing).—I am very enthusiastic about osteoperiosteal bone grafting. I like it well when there is not a large defect. No special apparatus is needed and altogether it is very useful.

The statement of the Doctor that free cartilage transplant quickly undergoes absorption is not in accordance with my observation. In a patient whom I have just shown you on the screen there are three pieces of cartilage in the forehead. They have been there three years. We intended to make him a nose, but another disease has prevented further surgery. These pieces of cartilage are apparently as large now as when transplanted. At the same time as when they were inserted a piece of his scapula, taken from the lower angle with its periosteum on both sides, was inserted in his left arm with the idea of making from it a septum for the new nose. This piece of bone has entirely disappeared.

Again, I showed you a face wherein I had transplanted cartilage to take the place of the lower margin of the orbit, zygoma and the anterior wall of the antrum. That boy came to me in France, in 1918, and I made a repair of the bony losses by osteoperiosteal transplantation taken from the tibia. The case was illustrated in an article in the *Medical Record* May 1, 1920. The pictures were taken some months after the bone and fat transplantation. The result looked perfect, as can be seen by referring to the article. Two years afterward he came again to me with the eye displaced downward and the cheek fallen in. This time I did a cartilage transplant, and it is interesting to note that nothing remains of my osteoperiosteal bone graft but fibrous tissue, as demonstrated at the second operation. The fat, too, had disappeared. I was led to believe that osteoperiosteal flaps always increase in size when placed in contact at the ends with living bone.

I emphasized the fact that the cartilage for cranioplasty must be thick. I have seen Chutro use a very thin piece of cartilage, but in that case the defect was quite small. For the repair of saddle nose, cartilage transplant is the best thing I know.

There is no doubt that a thin layer of bone can be used for replacing a lost part of the skull. There is no certainty that it will endure. If the defect is very large, I do not think it is advisable to remove a corresponding portion of the outer table. Cartilage is more easily procured. One patient shown you had been operated upon twice before. A surgeon had considered the opening too large to close by bone transplant and had closed it with fascia and muscle.

It is more difficult to get the bone than to get the cartilage and so far as I know at present the cartilage does just as well as the bone. Generally, if suppuration occurs, bone graft is lost. This is not true of cartilage transplant, as we have seen in the boy whose face I showed you. The cartilage healed in, although suppuration occurred. Suppuration was due, I think, to passing a needle into the lacrimal sac.

Replying to Dr. Koontz, for that particular condition the ala should be separated from the bony margin of the nasal opening in the skull; and then through the incision made between the eyebrows a piece of cartilage and bone is inserted and pushed on down toward the tip of the nose. The nose should be pushed down farther than is necessary, as there will be some shrinking. A piece of cartilage *only* in this shrinking process will ride backward and upward on the skull, but if the bit of rib is left attached to the cartilage and this end placed in contact with the skull, or, better, counter-sunk in the same, bony union will occur, and no backward slipping will be possible. I do not recall who first advised this operation, but am proud to say he was an American.

THE IMPORTANCE OF EARLY DIAGNOSIS IN ACUTE ABDOMINAL CONDITIONS*

By J. Louis Ransohoff, M.D., F.A.C.S., Cincinnati, Ohio.

The acute abdomen has been for more than ten years a favorite medical topic. The literature is monumental, and there must be some valid excuse for reopening so hackneyed a topic. My excuse is that despite the enormous literature, despite the plain teaching of the standard textbooks, men are still to be found in every community who, either through carelessness or ignorance, fail to accept the modern teaching. In medicine, which still is an art rather than an exact science, there is always room for individuality of thought and action. There are, however, certain cases in which the way is clear and the road lost only by the inexperienced or careless traveler.

We all acknowledge that in diphtheria, or even suspected diphtheria, the administration of antitoxin means the saving of life. I think you will agree with me that the man who stubbornly refuses to give antitoxin commits a crime against medicine and a greater crime against humanity. I feel that a man who allows a frank appendicitis to rupture before operation commits the same crime. During the war

*Read before Southern States Association of Railway Surgeons, Auxiliary of the Southern Medical Association, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

every wounded soldier was given tetanus antitoxin, and thousands of lives were saved. The man who disobeyed this general order was courtmartialed. Unfortunately we have no courtmartial to fall back on in civil practice. In fact, our medical ethics almost force us to protect the doctor who waits with his acute abdominal cases until a general peritonitis has occurred and the comparatively mild case has changed to one of extreme hazard, or even to a fatal outcome.

When we speak of the acute abdomen we naturally first think of the appendix, which is the cause of at least 80 per cent of our acute intra-abdominal conditions. Acute infection of the gall-bladder, the stomach, the pancreas, the intestine and the internal genitalia are, because of their relative infrequency, of secondary moment. In an analysis of the cases reported from any large hospital, we see two groups of acute appendicitis: one, acute suppurative appendicitis; two, acute suppurative appendicitis with perforation. In the one group the mortality is practically zero. In the second group it may run from 20 to 50 per cent, depending on the severity of the case and the generosity of the staff. When I speak of the generosity of the staff I mean this literally, for there are two classes of operators: first, the true surgeon; second, the man who operates for statistics. As we all know, there are men who, with their reputations rather than the welfare of the patient in mind, refuse to operate upon those cases which seemingly have only a small chance of recovery, who selfishly deny the patient his only possible chance for life. Unless the patient is practically moribund, there is no acute abdominal inflammation so advanced that proper operation does not offer some decided chance of recovery.

I remember one of the first cases of this kind which came to my notice. It was during my first year of assistanceship to Dr. Joseph Ransohoff.

The patient was a minister, about 50 years of age, who was brought into the old Good Samaritan Hospital, from Maysville, Ky. He had had a perforation five days before. He was tremendously distended; pulse running from 140 to 160; and temperature 104° at the time of operation. He had at the time of operation a septic jaundice, almost the color of a man with a stricture of the common duct. Operation revealed a general peritonitis, from the basal rupture of an appendix. The abdomen was not only filled with pus, but there was a large amount of free feces in the abdominal cavity. The abdominal cavity was extensively drained and the man made an uneventful recovery.

I remember this case distinctly because it was the first case of its kind which I ever saw recover. Since then these cases have been too numerous to tabulate. I cite it to urge the necessity of giving every patient a chance. Of course I am cognizant of the starvation treatment of these cases, but I have no personal knowledge of its workings.

From the standpoint of emergencies, the cases which must interest us most are the acute appendices and the perforated gastric and duodenal ulcers. The acute gall-bladder comes entirely in a separate category, and as an emergency operation is only necessary for acute gangrene or rupture from injury. Once the diagnosis of appendicitis is made, in my opinion immediate operation is imperative. There is but one exception, and that is in clearly subsiding cases, cases which have evidently passed the climax of the inflammatory process. The diagnosis of a typical appendicitis is so stereotyped that frequently the diagnosis is made by the patient himself. It is almost impertinent for me to reiterate these oft-repeated symptoms, but I can not help calling your attention to a few points, particularly some of the sheet anchors, to which we can no longer tie. Of all the symptoms which we know there are only, in my opinion, three which are worth while: the pain, the tenderness and the rigidity. The pain so reliable in the beginning may disappear at the crucial moment. As you all know, the sudden cessation of pain without an equal absence of rigidity may mean that the safety point has passed and that the filled appendix has ruptured and instead of the simple appendix we have a peritonitis to deal with. The tenderness, too, may mislead us unless we are certain to look for it in the right place. In an ordinarily located appendix, the tenderness is very classical over McBurney's point, where every student first puts his hand in making an abdominal examination. But the appendix is found, in many cases, not ileo-cecal or ileo-colic or pelvic, but retro-cecal, and in these cases the tenderness is not at Mc-

Burney's point, but in the flank. There is one symptom which is rarely, if ever, misleading, and that is the rigidity of the right rectus and right external oblique. There are two kinds of rigidity, the superficial and the deep. In the less severe forms of peritoneal inflammations the very superficial rigidity may be present and the deep rigidity entirely absent. This is, however, particularly true of the sub-acute and chronic rather than the acute cases.

In eliciting tenderness and rigidity in an abdominal examination, it is particularly important that a certain technic should be followed. That is, that the examination should be begun on that side of the abdomen which is free of the disease, leaving the suspected area for the final examination. This prevents any volitional rigidity of the abdominal muscles over the area which the patient himself may suspect is involved.

It is occasionally of interest to make a final diagnosis in an obscure abdominal case after the patient is partially under the anesthetic, when pressure over the area of suspected involvement will cause a rigidity and evidences of pain. By this manoeuver we have frequently changed the diagnosis just before making an incision from involvement of the gall-bladder, let us say, to that of appendicitis, or vice versa.

Although an increased leukocyte count is of importance as an aid to diagnosis, too much stress must not be laid on its absence. There are some internists who largely depend on the increased leukocyte count as an indication for operation. In some of the most virulent cases, particularly streptococcic infection, there may be absolutely no increase in leukocytosis, not even a comparative increase in the polymorphonuclears. In our own service we make a leukocyte count, for record, in every case of suspected acute abdominal inflammation. We never, however, withhold operation because of the absence of leukocytosis. In children, particularly those under three years of age, the diagnosis of acute appendicitis is difficult, owing to the impossibility of co-operation on the part of the patient. It is the difficulty of diagnosis which makes the mortality of acute appendicitis among children so high. We must, in these cases, rely entirely on the temperature, fast pulse, and particularly the rigidity. And it is in these cases that the diagnostic intuition accumulated through the observance of many cases plays so large a part. In children it is particularly necessary not to delay operation, as they bear purulent conditions very badly. In these cases it is always necessary to rule out acute lobar pneumonia, as pneumonia in children may start with symptoms almost typical of acute appendicitis. In one instance I removed a comparatively normal appendix from a child of six years of age. All the classical symptoms of appendicitis were present: rigidity, increased leukocyte count, fever and tenderness. The day following the operation the child developed a typical case of lobar pneumonia. This case was seen in consultation with one of our most prominent internists, who made a very careful pulmonary examination without eliciting any evidence of pneumonia. Fortunately, this patient made a complete recovery. Ever since this time I have been particularly careful always to make a thorough pulmonary examination. With every care shown in the study of a case, surprises will come from time to time when we operate for a supposed appendicitis. I have recently reported the case of a child of twelve, with typical symptoms. The operation revealed what I believe to be a unique condition, namely, a pelvic ectopic kidney attached to the right tube with a twisted pedicle. The ureter of course was completely obstructed and therefore the urinary findings were negative.

The acute gall-bladder presents an entirely different proposition from the acute appendix. Except in those rare instances of gangrenous inflammation, operation should not be done during the acute stage. Nearly all of these patients recover from their acute inflammation, so that operation may be more safely done in the interim. The diagnosis here rests on the location of the tenderness under the ninth right costal cartilage, the tenderness in the back and above all the interference with respiration when deep pressure is made under the costal arch. This is an almost infallible sign of gall-bladder inflammation and will rarely lead the surgeon astray. The other

conditions which may be met with in the upper abdomen are particularly acute perforations of gastric and duodenal ulcers and an acute hemorrhagic pancreatitis. These three conditions all start with such tremendous severity that they may be almost classed together as what may be termed an acute intra-abdominal disaster. Shock, rapid pulse and more or less collapse are common to all three conditions. This, with a tenderness and board-like rigidity of the upper part of the recti muscles, certainly points to an immediate operation without the necessity of making an exact diagnosis. Particularly in the perforation of gastric and duodenal ulcers, every hour counts in the patient's chance for his life, and every hour's delay means an increased mortality. Nearly all of those cases operated upon during the first twelve hours recover.

Any one who has seen these acute abdominal disasters will realize the necessity for immediate operation. We must educate the general practitioner and the internist to realize that these conditions are primarily surgical.

There is no need to dwell on the importance of the diagnosis of intestinal obstruction, either from a strangulated hernia or from an internal strangulation. Many of these cases are so typical that a mistake in diagnosis is almost inexcusable, and yet not infrequently cases are brought in during the last stages of the intestinal obstruction with a history of days of suffering. When the patient gives the history of a previous abdominal operation it is practically certain that there is an intestinal obstruction due to strangulation from some inflammatory band of adhesions. The rarer causes, such as an internal hernia, should always be borne in mind, but it is sufficient in all these cases to make the diagnosis of obstruction and leave the exact diagnosis to be determined on the operating table, only realizing the necessity for immediate operation. The same applies to hyper-acute pathologic conditions in the lower abdomen and pelvis. Twisted pedicles, of ovarian tumors, intra-peritoneal ruptures, of some subperitoneal vein, of a fibroid uterus, and last but most important, ruptured tubal pregnancy, are among the conditions which imperatively demand quick interference. Often, of course, a positive diagnosis can be made, and always it may be tentative. Whether the one or the other matters little, the indications being clear in both for earliest interference.

Time forbids my going any further into this question. I have only attempted to touch on the high lights, leaving out the less important details. What I have endeavored to show is that the acute abdomen is from the beginning a surgical condition, and the earlier operation is undertaken the greater is the chance for the patient's life.

DISCUSSION

Dr. T. H. Hancock, Atlanta, Ga.—While this paper does not relate to railway surgery, it is a good one for all surgeons to hear. I am satisfied that most of us err in not opening up the abdomen promptly in cases where we suspect rupture of the kidney, rupture of the intestine, rupture of the bladder, or rupture of the spleen. Every patient who has had a severe blow on the abdomen should be watched closely. When he comes in, we of course first catheterize the patient to tell absolutely whether there is any trouble to the bladder. If in twelve hours there is any marked rigidity I believe we should do an exploratory operation in all these cases. I know I have erred in many cases as I look back and see that I could have saved the patient, if I had operated early.

Dr. J. W. Palmer, Ailey, Ga.—This brings to my mind a case of railroad surgery where there was an acute abdomen from traumatic injury. It was a section foreman. One of his men, in doing some kind of work where he used a pick or a crowbar, drew back to make his lick and hit him in the abdomen with his instrument. The section foreman was in a great deal of pain. He called in his family physician, who was not a railroad surgeon. There was absolutely no sign of any external or internal injury. The family physician delayed calling in surgical aid. When the surgeon was called in, the man had symptoms of obstruction and abdominal peritonitis and still no external spmptoms. On examination he found a mass there. He operated and when he went into the abdomen he found there was a puncture of the intestine. Several inches of the intestine was already gangrenous and the result was this patient died. It cost the railroad a considerable amount of money, all because of the lack of early diagnosis of this internal traumatic injury of the abdomen.

Dr. L. E. Burch, Nashville, Tenn.—Dr. Ransohoff brought out three points in making diagnosis: pain, localized tenderness and rigidity. I should like to add another that, in my opinion, takes precedence over the other three: a careful history of the case.

The blood count, in the great majority of cases, is of great value, in others it is of no value. Occasionally one sees a low blood count

with a virulent infection. It is quite easy, in the early stages of pneumonia, to mistake it for appendicitis, for the reason that the physical signs are not present. A pneumonia due to the pneumococcus in the first twenty-four hours will give a blood count over thirty thousand. You will rarely in acute appendicitis get a blood count over thirty thousand in the first twenty-four hours. I have used the blood count in the army in many cases in making a differential diagnosis between pneumococcus pneumonia and appendicitis and consider it of great value.

Dr. E. T. Newell, Chattanooga, Tenn.—I should like to add one more symptom to the class of symptoms that Dr. Ransohoff brought out, and which were elaborated on by Dr. Burch: that is pain followed by nausea. You will find this in every case. This was called to our attention by Dr. Murphy, of all the symptoms to which you can tie. You will find in all acute appendices, or nearly all of them, that the nausea follows the pain. Now in regard to the blood count, as Dr. Burch says, an extremely high leucocyte count in pneumonia is very characteristic. I should like to report a railroad case in discussing this paper. A man had a fracture of the pelvis and was brought in with many minor injuries to other parts of his body and was in an extreme condition of shock. The other man who was riding with him at the time he was hit by the train was killed outright. He was almost moribund. He required a great deal of morphin to relieve his pain and voided some bloody urine. That night and the next morning he had to have two or three additional hypodermics of morphin, showing that he was suffering great pain. He was placed on the Allen stretcher as soon as he was brought to the sanitarium and should not have suffered greatly. In the treatment of cases of fracture of the pelvis, I think that the Allen stretcher is one of the best aids. Of course, we did not manipulate the fracture at all, or at any rate very little, for fear of the fragments cutting deeper into the bladder or into the abdominal viscera. But when we found that the condition was growing worse and at the end of twenty-four hours he was almost moribund, with a hard board-like abdomen, such as we have in duodenal and stomach ulcers which have ruptured, we opened the abdomen and found that a spicule of bone of the transverse ramus of the os pubes had punctured the bladder and the abdomen was full of urine and blood. This case was one in which we had complications, and it was one of those extreme cases Dr. Ransohoff mentioned in the first part of his paper, where it was hardly worth while to go into the case. We introduced a drain in the intestines, one in the abdomen and one in the bladder. The man recovered. Later we closed the intestines and bladder, but failed in the bladder closure at that time, as the patient pulled his urethral catheter out and the bladder sutures gave way. Later on we went back and closed the bladder successfully. The fracture of the os pubes united firmly. The patient is now back at work and doing well. I merely mention this case for it was an acute abdomen which hardly seemed worth undertaking, which recovered.

Dr. R. B. James, Danville, Va.—The subject of abdominal injuries, tho not covered by the paper under discussion, is such an important matter to railroad surgeons that I shall tell you of an experience I had lately. Recently I read in the *International Journal of Surgery* an article in which the writer emphasized the danger in which appeared to be slight abdominal injuries. Cases that showed no shock or pain may prove fatal in a few days. Death may be caused by ruptured blood vessels or internal viscera, which show no symptom at the time but develop peritonitis or shock when it is too late to interfere. I had this paper in mind when called the other day to see a saw mill man struck an hour before in the side of the abdomen by a piece of flying timber. He had no symptoms to suggest internal injury. Pulse and respiration were normal. There was no pain, no shock, and the expression on the face was normal. Having this article in mind I spent an hour observing the patient. He did not complain of any discomfort but vomited the food he had eaten several hours before. There was an abrasion on his side over the spleen and left kidney. Seeing the size of the piece of timber that struck him I thought it probable that he had internal injuries, and advised an exploratory incision. The patient readily consented. I sent him to the hospital and opened the abdomen four hours after the accident

In the operating room were other doctors who said it was useless to open him up, that with no symptom there could be no serious internal injury. I told them if they had seen the piece of timber that struck him they would not be so sure. I found the abdomen full of blood. The spleen was ruptured and bleeding furiously, necessitating its removal. The patient made an uneventful recovery and seems to be well today. The gentleman who has just spoken seemed to think that a surgeon could make a diagnosis in these cases with more certainty than a medical man. In many of these cases no man could make a diagnosis. There are no symptoms on which to hang his diagnostic hat, so to speak. You look around and see what has happened, what caused the injury and then decide, remembering in case of doubt that it is safer to open up and see.

Dr. J. S. Turberville, Century, Fla.—I think it well to review what Dr. Murphy had to say as to the appearance of the symptoms. He mentioned the following points upon which to make a diagnosis of acute appendicitis. This applies to all inflammatory abdominal conditions: pain, nausea and vomiting; nausea or vomiting; increased pulse rate; rising temperature; localized tenderness; and rigidity. Now, the exceptions are quite a few where you don't have those. Occasionally you will find tenderness without rigidity. Occasionally you will find rigidity all over the abdomen. I think we can explain why we don't have blood count symptoms. It doesn't matter whether it is streptococcus or what kind. The inflammation is so violent that it chokes out the circulation. Then you don't have fever, you don't have leucocytosis, and you don't have any increased pulse rate, and you may not have so much pain because the appendix is dead. This is a very dangerous condition. Bearing that in mind, after you have gone through Dr. Murphy's symptoms as they appear, there is one point always to remember, that you won't always have fever, and you may not have rigidity.

APOPLEXY OF THE PLACENTA*

By M. Pierce Rucker, M.D.,
Richmond, Va.

Solid areas in the placenta have engaged the attention of obstetricians and pathologists for a number of years. There have been many theories advanced as to their causation and many terms applied to the condition, such as placentitis, scirrhus, atrophy, hepatization, apoplexy, phthisis, fatty and fibrofatty denegeration of the placenta. Their macroscopic appearance naturally suggests the name placental infarcts, as they look like the familiar embolic processes found in the spleen and other organs. This terminology, however, is criticised by G. Schickele[1] and others on the ground that the cause of these areas is not embolism, but an arteritis, as was first shown by Ackermann in 1882. Williams[2] has made a very exhaustive study of the subject, based upon the microscopic examination of 500 consecutive placentae. His classification of placental infarcts is as follows:

1. Small whitish, or yellowish, fibrous areas either on the fetal or maternal surface, rarely more than a few millimeters in thickness.
2. Wedge-shaped or irregularly round, dull white areas with a striated fibrinous appearance, sharply circumscribed.
3. One or more whole cotyledons converted into a pale, white, dense fibrous mass.
4. "Placenta marginata" and "margo placentae."
5. Pink or brick dust colored masses, usually large.
6. Bright red or almost black round masses, sharply circumscribed by a whitish fibrous capsule. These masses are composed almost entirely of blood (apoplexy of the placenta).

The first five classes are caused by an endarteritis of the vessels in the villi. This causes a coagulation necrosis and fibrin formation in the tissue just beneath the syncytium. The fibrin formation extends in either direction into the deeper portions of the villi and into the intervillus blood. When this change takes place in contiguous villi, the intervening maternal blood undergoes coagulation and the villi become fused into a compact mass by the fibrin. The color of the mass depends somewhat upon the rapidity and the age of the process. The sixth class is much rarer, and Williams has not met it often enough to form any conclusion as to its etiology. Several theories have been suggested. One is that for some reason a hemorrhage takes place into a previously formed infarct. As the infarct is largely composed of blood in the intervillus spaces, and the intervillus spaces are in reality blood vessels, this is equivalent to saying that a hemorrhage takes place into a blood vessel, which is an anomaly. Schilling has suggested that the red infarcts are in some instances, at least, due to a thrombosis that originates in the maternal vessels of the decidua and then gradually spreads into the intervillus spaces. Whatever the etiology may be, there seems to be an especial relationship of red infarcts to albuminuria in the mother on the one hand, and to death of the infant on the other hand. A number of French observers called attention to this relationship many years ago. Rouhaud, in 1882, noted that 40 per cent of the cases with albuminuria had red infarcts of the placenta, and that 40 per cent of the cases with red infarcts had dead infants.

Williams' conclusions cover the question of placental infarcts so thoroughly that I give them in toto:

1. Infarcts measuring at least 1 cm. in diameter were seen in 63 per cent of his cases.
2. Smaller infarcts, many just visible to the naked eye, were observed in the great majority of placentae, while microscopic examination revealed early stages of infarct formation in every full term placenta.
3. The primary cause, in a great majority of the cases, is endarteritis of the vessels of the chorionic villi.
4. The primary result of endarteritis is coagulation necrosis of the portions of the villi just beneath the syncytium with subsequent formation of canalized fibrin, which is followed by coagulation of the intervillus blood and matting together of adjacent villi.
5. The part played by the decidua in the production of infarcts has been greatly over-estimated.
6. Moderate degrees of infarction possess no pathological significance and exert no influence upon mother or child and are to be regarded as a mark of senility of the placenta.
7. Marked infarct formation is not infrequently observed and often results in the death or the imperfect development of the fetus. It is usually associated with albuminuria on the part of the mother, though at present we can not account satisfactorily for the relationship between them.

*Read in Section on Obstetrics, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

8. Infarction formation is not particularly marked in cases of acute eclampsia, being usually observed only in those cases which are preceded by marked albuminuria.

9. There is no evidence in favor of the bacterial origin of infarcts.

There is very little in the literature concerning the clinical aspects of placental infarction. DeLee, in his text book, says:

"Clinically, infarcts can not be diagnosed, but their existence can be expected in cases of nephritis, heart disease, syphilis, endometritis, and when they were present in previous pregnancies. Mention has been made of the fact that those infarcts which take in one or several cotyledons may reduce the oxygenating area of the fetus and also the nutritional functions of the placenta, so that the child is puny or even starved to death. Cognizance is taken of this fact in deciding on the induction of premature labor in nephritis. Extensive infarct formation is often associated with adherent membranes and the retention in the uterus of masses of thick decidua, which often gives rise to annoying oozing after the third stage of labor, and even severe post-partum hemorrhage."

William C. Danforth[3] reports a case of marked placental infarction in a II-gravida.

The patient in the latter half of her pregnancy had a rising blood pressure (up to 160) with marked albuminuria. Her symptoms disappeared upon restricted diet and rest in bed. In several weeks the albumen reappeared in the urine and persisted until delivery. The patient went into labor shortly before term and was delivered of a two and 14/16 pound baby that was perfectly formed. The child died in eighteen hours. Only about one-third of the placenta was functioning, the remainder being taken up by infarcts. The author thinks that the small weight of the baby was due to the decreased blood supply. The uterus just before delivery reached about to the umbilicus, where it had remained for months without any evidence of growth. There was no edema of the mother.

I have recently had a case very similar to Danforth's.

This patient was 27 years of age and pregnant for the first time. She consulted me first on February 21. She menstruated last on January 3 to 8 and had been greatly nauseated for a week. Her heart and lungs were normal. Systolic blood pressure 110, diastolic 80. Blood Wassermann was negative. Hemoglobin was 76 per cent. The pelvis was normal. The uterus was softened and retroverted. For the next four weeks her nausea was very troublesome. The latter part of March her nausea was much better, but she was having headaches frequently. For a few days in the early part of May she had a severe cold, with sore throat and general aching. On June 24 she complained of a numbness in her arms that woke her up at night. On June 27 she complained bitterly of a pain in the right arm and thumb. This persisted until the first part of August. Her teeth were x-rayed and found to be normal. Except for these evidences of toxemia of undiscoverable origin, the patient had a normal pregnancy until September. Her urine had invariably been negative and her blood pressure varied from 100 to 110 systolic and from 60 to 80 diastolic. On September 5, a month before her expected confinement, I examined her with the idea of checking up the time for confinement. I was greatly surprised to find that her Ahlfeld was only 21 cm. and her McDonald 24 cm. The position was R. S. A. Fetal heart was 155. The blood pressure on that date was 110-80 and the urine was free from albumen and sugar. The patient was feeling well and had no headache nor edema. Her bowels were regular. Her only complaint was a slight backache. On September 19 she was having a dull headache and a generalized pain in the abdomen. The face looked a little pasty. Blood pressure was 140-90. The urine showed a large amount of albumin, but no casts. Her diet was restricted to bread and water and she was put upon cream of tartar lemonade. The next day the face was greatly swollen. Blood pressure was 155-100. The urine curdled on boiling.

Induction of labor was advised, to which the patient readily consented. A No. 2 Voorhees bag was placed in the cervix and left overnight. The patient began having pains early in the morning. At 10 a. m. the bag was removed and a No. 4 bag introduced. This was out of the cervix in an hour and was removed. The bag of waters broke in the afternoon and it was noted then that the cervix was hard and unyielding. A little after midnight the fetal heart had become irregular and slower. The cervix was two-thirds dilated. The patient was etherized and the dilatation was completed manually. An easy delivery with forceps was effected. The child, a girl, was resuscitated with a lung motor, but died on the day of delivery. She weighed 3 pounds and measured 41 cm.

The placenta was adherent, and after an hour and a half it was delivered manually and in fragments. It was pale pink in color, but was in so many fragments that I was unable to tell whether or not there was any marked infarction.

The mother made an uneventful recovery. Her highest temperature was 100° on the third day. She left the hospital on the eighth day. Examination on the twenty-fifth day showed her to be normal except for a liver that was palpable in the mid-clavicular line. Her hemoglobin was 84 per cent and her urine free from albumin and sugar. Her blood pressure was 130-90.

The retardation of fetal growth in this case, together with the rising blood pressure and the suddenly appearing albuminuria, are very suggestive of marked placental infarction, but on account of the unfortunate complication that required the delivery of the placenta in fragments, I was unable to demonstrate the infarction and therefore can not include this case in my series.

Reid and Costa[4] report a case of premature labor, the second the patient had had, in which the infant was dead and the placenta showed white infarcts. The labor was slow and accompanied by slight convulsions. The urine contained a considerable quantity of albumin. Reid has seen

quite a few cases in which healthy women gave birth to children dead two, three, four or more days before birth — children in whom nutrition was apparently perfect— the cause of death being unknown and labor rather premature. He believed that syphilis had nothing to do with these cases, but that rheumatism was a causative factor. Coats, in discussing the placenta, said that there were peculiar white wedge-shaped consolidations suggesting in appearance the well-known embolic infarction of the kidneys and spleen, and therefore the condition is naturally called "white infarction of the placenta." In some cases the infarction was not white, but red and suggested hemorrhage. In others the central parts were slightly softened as if subsequent change were occurring in the tissue. He believes the lesions arise on the maternal side of the placenta.

In the past three years there have occurred in my practice six cases in which there were large red infarcts. These patients have presented a symptomatology definite enough, it seems to me, for the condition to be recognized clinically.

REPORT OF CASES

Case 1.—Clinical summary: marked albuminuria with a few casts; a sudden rise in blood pressure; edema of the feet and face; no subjective symptoms; premature labor with ante-partum hemorrhage; still born infant; a large red infarct occupying two-thirds of the placenta.

Mrs. N., age 32 years, weight 119 pounds, height 5 feet 4 inches. She had been pregnant once previously and aborted at three months. Her family history and past history were negative. She menstruated last from November 15 to 20, 1916, and consulted me first on May 16. At that time her blood pressure was 130 systolic, 90 diastolic. Her heart and lungs were normal. Pelvis was normal. She had an abdominal tumor that corresponded in size and shape to a twenty-four weeks pregnant uterus. The urine was free from albumin and sugar.

On June 5 her urine contained abundant albumin and a few casts. Specific gravity was 1028. The next day I called upon the patient to report on the urine and to put her to bed on a water diet. I found her perfectly comfortable. Her face was greatly swollen and her blood pressure was 195-115. The fetal heart could not be heard. Two hours later she began to have pains in the abdomen and some bleeding from the vagina. The pains became more severe. The child was delivered by the breech. Duration of labor, 8 hours and 40 minutes. Perineum was intact. No anesthetic used. The third stage lasted 25 minutes and there were no complications. Blood pressure at the end of the third stage of labor was 200-140. The child was still born. He measured 34 cm.

The placenta showed a dark red infarct that occupied two-thirds of its area. The infarct measured 6x9x4 cm. and was composed principally of firm organized blood clot. There was a marked contrast in the thickness of the infarct and that of the adjacent portion of the placenta, which was only about 1 cm. in thickness.

The mother made an uneventful recovery. In October, 1919, she had a placenta previa, twins, and premature delivery. I had her under observation for two weeks before this confinement, and during that time she suffered from headache, albuminuria, edema and high blood pressure ranging from 160 to 190. Her Wassermann was negative. The placenta on this occasion was a single one and it contained many small white infarcts. In December this patient was suffering from headache and constipation. Her blood pressure was 140 systolic, 90 diastolic.

Case 2.—Clinical summary: marked albuminuria, a high blood pressure that continued to rise in spite of rest in bed, bread and water diet and saline purgation; no edema, no eye symptoms, no subjective symptoms save headache, pain in epigastrium and nausea for 24 hours three days before delivery. Partial separation of the placenta, premature infant that died on the second day, large red infarct occupying one-third of the area of the placenta.

Miss C., aged 19 years, weight 146 pounds, pregnant for the first time. Family history and past history negative. She menstruated last September 3, 1918. Patient consulted me first on May 26. Her blood pressure was 150-110; Wassermann negative. There was a systolic murmur at the apex. The lungs were apparently clear front and back. Pelvis was normal. Urine was acid, 1020, no sugar, large trace of albumin. On June 4 the urine was loaded with albumin. The patient was complaining of headache, pain in the epigastrium and nausea. She was put to bed on a bread and water diet. The next day her blood pressure was 180. She began to have pains June 7. The pains were irregular. The first stage lasted 17 hours. A Potter version was done. When the head was disengaged a quantity of bloody fluid escaped. On introducing the hand into the uterus it was noted that the placenta was implanted low down upon the right side and was partially detached. The perineum was not torn. Anesthetic was ether. The baby was resuscitated after 45 minutes, but died on the second day. She weighed 4 pounds and measured 44.5 cm. The third stage of labor was normal. Blood pressure at the end of an hour was 130-90.

The placenta showed a large red infarct occupying the entire thickness of the placenta and about one-third the size of the placenta. The mother made an uneventful recovery.

Case 3.—Clinical summary: rising blood pressure with subsequently appearing albuminuria. No subjective symptoms. Induction of labor after some delay in getting patient's consent. Macerated infant, several large red infarcts, one of which had a grey necrotic center.

Mrs. W., age 29 years, weight 156 pounds, pregnant for the first time. A maternal uncle and aunt died of tuberculosis, but there had been no house exposure for the patient. The patient had suffered a great deal with her throat until several years ago, when she had a tonsillectomy.

She menstruated last on July 8 to 12 (1919) and consulted me February 13. At that time she had mucous rales at the base of the left lung. Heart was normal. Blood pressure 135-90; Wassermann negative. Urine acid, 1020; no albumin, no sugar. Pelvis was normal. She had a thick purulent discharge from the cervix that showed diphtheroid bacilli.

On February 20 the urine was normal and blood pressure was 130-90. On March 5 she complained of frequent headaches. Blood pressure was 140-120. There was no edema. The patient was put upon a meat- and broth-free diet and on March 12 was free from headaches. Urine was negative. Blood pressure was 140-100. On March 20 the patient was listless and had pains in the abdomen. She had no headache. Blood pressure 150-100. Urine showed a quantity of albumin. On March 23 and 24 the urine was practically free from albumin. On March 28 it was noted that the patient was having several bowel movements from the salts that she took each morning. Blood pressure 150-100. The urine showed only a trace of albumin. From this time until the patient consented to operation she was kept on a strict bread and water diet. She was seen daily. The blood pressure varied from 140 to 155 systolic and from 100 to 115 diastolic. The urine showed only a slight trace of albumin. On April 6, after a preliminary dose of morphin and scopolamin, a No. 4 Voorhees bag was introduced. The pains started up in several hours and lasted about four hours. As soon as the bag escaped from the cervix the pains stopped and the patient was delivered by Potter's version. The perineum was intact. Anesthesia was chloroform. The child was macerated. Its weight and length were not recorded. The trunk measured 34 cm. The third stage of labor was normal and lasted 10 minutes.

The placenta showed several large red infarcts, one of which had a grayish center. The puerperium was normal. Autopsy on the baby showed nothing except in the liver, where there was considerable degeneration.

Case 4.—Clinical summary: sudden rise in blood pressure uninfluenced by diet and rest. No albuminuria. No subjective symptoms, induction of labor, live baby. Several white infarcts and a large central infarct filled with clotted blood.

Mrs. L., aged 22, weight 98 pounds, height 5 feet 6 inches, pregnant for the second time. Her first pregnancy resulted in a five months' abortion. She menstruated last September 9 to 14, 1919, and consulted me first on December 16. Her family history and past history was unimportant. Heart and lungs were negative. Blood pressure 118-60. Wassermann negative. Pelvis normal. The patient came to the office twice each month, and during that time she was free from headache, constipation and edema. Her blood pressure did not go above 130 and her urine was free from albumin. On May 4 it was noted that her face and feet were a little swollen and that her blood pressure was 175-110. Her bowels were regular and she had no headache. Urine was acid, 1020; no sugar; slight trace of albumin. Her diet was to consist of bread, water, rice and potatoes. On May 6 she had headache and was unable to see well, but the next day she felt well, no headache, no impairment of eyesight. Her face had lost its waxy appearance. Patient was seen daily until she was delivered. She continued to feel well, although the pressure remained up, from 155 to 160 systolic and 100 to 110 diastolic). On May 14 labor was induced with a No. 4 bag. When the bag was placed the position of the fetus was R. O. A., but when the bag came out a foot appeared at the vulva. The patient was delivered by Dr. Harrison in my absence, and he was so interested in the appearance of the placenta that he demonstrated it to the patient's mother without knowing that I had diagnosed the condition previously. Perineum was intact. Anesthesia, chloroform. Third stage of labor normal. Blood pressure at the end of an hour 145-90. The child required very little resuscitation. He weighed 5 pounds and measured 47 cm.

The placenta showed several white infarcts and a large central red infarct filled with clotted blood. Both mother and child made an uneventful recovery.

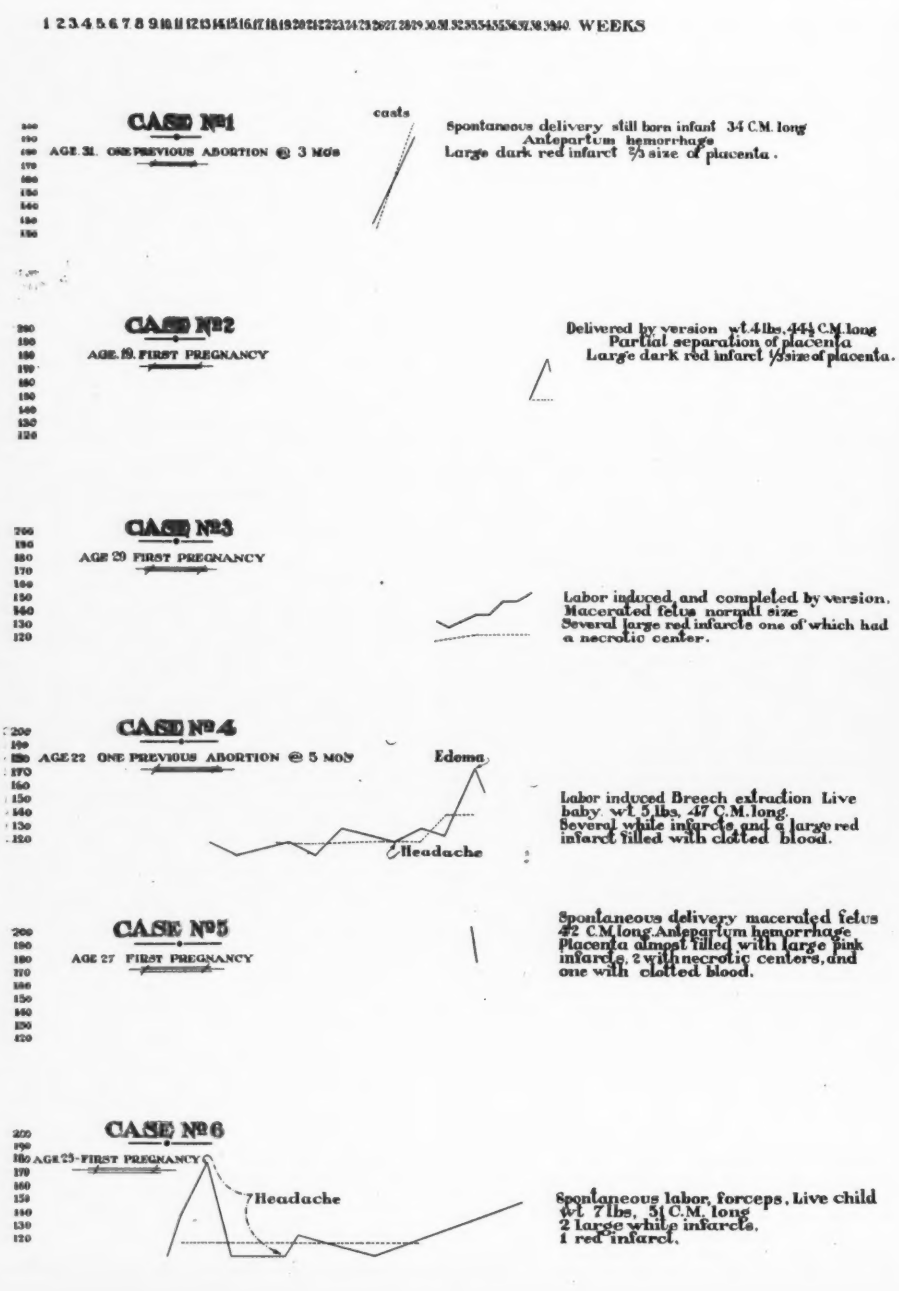
Case 5.—Clinical summary: admitted with high blood pressure. She went into labor almost upon arrival at hospital and no urinary examination was made, no subjective symptoms, antepartum hemorrhage, spontaneous delivery, macerated fetus. Several large pink infarcts, two of which had necrotic centers, and a third was filled with blood clot.

Miss S., age 27 years, pregnant for the first time. She menstruated last January 4-11, 1920. She came into the Spring Street Home August 30 and went into labor that night. Her heart and lungs were negative. Blood pressure 205-140. She had moderate and regular pains and delivered herself spontaneously after 20 hours of labor. There was a first degree tear of the perineum. No anesthetic. The third stage of labor was normal. Blood pressure after the completion of labor was 180-120. The child was macerated. He measured 42 cm.

The placenta (see illustration) was almost completely filled with large pink infarcts. Two of these infarcts have broken down necrotic centers, while a third is filled with clotted blood. The mother made an excellent recovery.

Case 6.—Clinical summary: rising blood pressure, no albuminuria, no subjective symptoms, save an occasional headache, no edema, spontaneous labor a week ahead of her expected time for confinement, living child, two large white infarcts and one large red infarct.

Mrs. M., age 25 years, weight 127 pounds, pregnant for the first time. Family history and past history unimportant. Menstruated last February 3 to 7, 1920. Patient consulted me first April 23. Heart sounds were clear except for irregular rhythm. Lungs were clear. Wassermann negative. Pelvis was normal. Blood pressure 110-80. Urine contained no albumin nor sugar. On May 7 patient was feeling well, and had gotten over her nausea. Blood pressure was 140-75. No headache, no edema, bowels regular, urine normal. On May 21 patient had occasional headache and pains in the hips. The pulse was irregular. Blood pressure 180-80. Urine was normal. From this time until August 13 the blood pressure and urinary findings remained normal. She felt well except for a little sore throat about the middle of July. On August 13 patient felt badly and had black spots before the eyes. No head-


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 WEEKS
CASE №1
AGE 31. ONE PREVIOUS ABORTION @ 3 MOS
casts
Spontaneous delivery still born infant 34 C.M. long
Antepartum hemorrhage
Large dark red infarct 2/3 size of placenta.
CASE №2
AGE 19. FIRST PREGNANCY
Delivered by version wt 4 lbs. 44½ C.M. long
Partial separation of placenta
Large dark red infarct 1/3 size of placenta.
CASE №3
AGE 29 FIRST PREGNANCY
Labor induced and completed by version.
Macerated fetus normal size
Several large red infarcts one of which had a necrotic center.
CASE №4
AGE 22 ONE PREVIOUS ABORTION @ 5 MOS
Edema
Headache
Labor induced Breech extraction Live baby wt 5 lbs. 47 C.M. long.
Several white infarcts and a large red infarct filled with clotted blood.
CASE №5
AGE 27 FIRST PREGNANCY
Spontaneous delivery macerated fetus 42 C.M. long. Antepartum hemorrhage
Placenta almost filled with large pink infarcts, 2 with necrotic centers, and one with clotted blood.
CASE №6
AGE 25 - FIRST PREGNANCY
Headache
Spontaneous labor, forceps, Live child wt 7 lbs, 5½ C.M. long
2 large white infarcts.
1 red infarct.

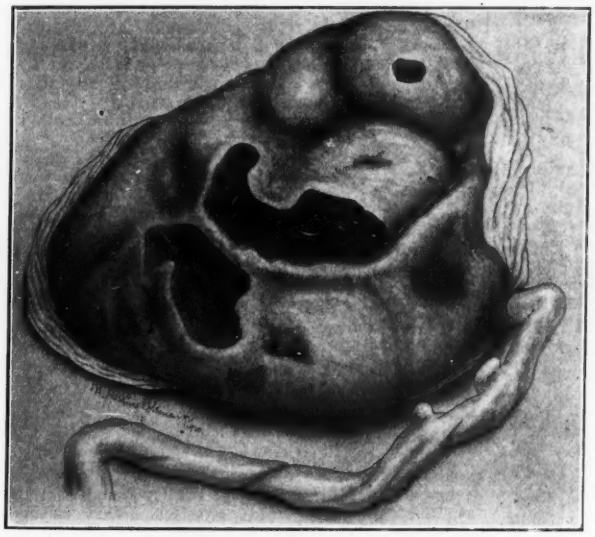
SOLID LINE REPRESENTS → Systolic blood pressure beginning from a base line of 120 M.M. Hg

DOTTED LINE REPRESENTS → Albuman in urine.

ache; bowels were regular. Blood pressure 110-80. Urine was free from albumin and sugar. The patient stopped coming to the office. On October 29 I called on her to see how she was getting along. She was feeling well and was free from headache. Her blood pressure was 150. The urine contained no albumin nor sugar. She went into labor November 1, had a slow, tedious time, and was delivered with forceps as soon as the cervix was dilated. There was a very slight tear. Anesthetic, chloroform. Third stage of labor was normal. The child breathed spontaneously. She weighed 7 pounds and measured 51 cm.

The placenta showed two white infarcts 4 cm. in diameter and one red infarct 6 cm. in diameter. The red infarct was distinctly thicker than the remainder of the placenta. Both mother and child did well.

Each of these cases had one or more red infarcts that occupied a considerable portion of the placenta. The color was dark red in five of the cases and pink in one. In two instances white infarcts were also present. In two of the cases there was necrosis in the center of the infarcts. In four instances the infarct was composed largely of clotted blood. In three cases there was evidence of a partial premature separation of the placenta.



Placenta of Case 5, almost completely filled with large infarcts, two of which have broken down necrotic centers, and a third is filled with clotted blood.

Microscopically the red infarct has the same appearance as the infarcts described and pictured by Williams, i. e., an obliterative endarteritis with necrosis of the villi so that they appear as mere shadows in a more or less uniform field of canalized fibrin. In addition, there is a quantity of free blood depending upon just what part of the infarct you take the section. While it is not my province in this paper, being chiefly concerned with the clinical aspects of the question and being deeply conscious that the limited material at my disposal precludes drawing any definite conclusion, to discuss the etiology of this condition, I can but be impressed with the association of large white infarcts in some placentae and of firm and degenerating ones in others. I feel that it is very likely that a more extended study will show that the white and red infarcts have the same etiology and that degeneration in the center of the larger ones is followed by hemorrhage that sometimes makes its way between the placenta and its attachment, causing a premature separation of that organ. According to Holmes,[6] in his thesis on "Ablatio Placentae,"

> "Rokitansky described placentae which had inflammatory deposits in the lobules with indication of placentary separation from extravasations of blood. He held that apoplexies could be intra- or retroplacental."

SYMPTOMATOLOGY

The most characteristic sign was a symptomless and rather sudden rise in blood pressure that resisted all treatment. This was associated with albuminuria in three instances. In two cases the urine remained practically free from albumin throughout pregnancy, and in one case no urine examination was made. Edema was noted in two instances. Next to the rise in blood pressure, the most characteristic thing about these patients was the absence of subjective symptoms. The symptoms that one would expect with high blood pressure, headache, disturbances of vision, nausea and epigastric pain, were rarely noted, and when present were very transitory. One patient complained of listlessness and vague abdominal pain. In the first case no blood test was made in her

second pregnancy, but at her subsequent pregnancy her Wassermann was negative. The remaining five cases had negative Wassermanns on their first visit.

DIAGNOSIS

The diagnosis was made correctly in two instances, cases 3 and 4, and in each instance induction of labor was advised in the interest of the child. In Case 3 this was refused until after the death of the fetus, but in Case 4 my advice was accepted with happy results. Case 5 was in labor when I first saw her and I had no opportunity of diagnosing the condition. In Case 6 the condition was suspected, but I had not been able to follow the case closely enough to feel certain of my diagnosis. The only case in which I made the diagnosis of apoplexy of the placenta and was not able to demonstrate the large red infarcts, was the case cited above with retained placenta. Clinically, this was very suggestive of marked placental infarction, but unfortunately the afterbirth was in such a bad condition that I was unable to come to any definite conclusion concerning it.

CONCLUSIONS

1. The term apoplexy of the placenta would seem appropriate, first, on account of the hemorrhage usually present in these infarcts; and, secondly, on account of the rather sudden appearance of the clinical signs.

2. The association of large white and red infarcts in the same placenta, the presence of necrotic areas in the center of many of the infarcts, and finally the presence of clotted blood in many of these infarcts with signs of premature separation of the placenta suggests that this may be the sequence of events in certain cases of ablatio placentae.

3. This condition presents a definite symptomatology that makes it possible to recognize it by carefully observing the patient in the latter part of her pregnancy.

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DISCUSSION

Dr. G. Bentley Byrd, Norfolk, Va.—Most of the literature on this subject seems to have dealt largely with the pathological rather than the clinical findings. There also seems to be still a difference of opinion as to their formation. Tweedy in his practical obstetrics (4th edition) states that white infarcts occur quite frequently but are of no clinical significance unless of sufficient size to interfere with nutrition of the child. However, pink or red infarcts, though found more rarely, are particularly noted in patients with albuminuria and in still-born cases. Morse, in the *American Journal of Obstetrics* (1919), states that he has produced experimentally in the rabbit the premature separation of the placenta by ligating the veins of one horn of the bicornuate uterus, and that the lesions resulting are identical with those in women with premature separation of the placenta. He has reached the conclusion that premature separation depends upon some obstruction to the uterine circulation.

As you probably remember, Myer and Lohse, in 1912, described certain cavities in the placenta which vary in form and are always empty. These cavities are of importance clinically, for in case there is open communication with the surface of the decidua, they may give rise to the erroneous impression that a part of the expelled placenta is lacking. They are of interest also because they may be related to the so-called white placental infarcts. They also found other cavities which were filled with a mucous substenance, and which, unlike the empty cavities, were in communication with the decidual surface. The filled cavities were filled with a thick membrane composed of layers of different cells, while the empty cavities were covered by a homogenous substance in which no cells were found. There were two hundred placentas examined and empty cavities were found in twenty-seven, cavities filled with mucus in twenty-eight, and both types of cavities in seven; or, in other words, 24 per cent of the placentas showed cavities. Along this same line Kuehnel noticed that the empty cavities are always intra-cotyledonous. He, therefore, classifies them according to their location. He is of the opinion that the red infarcts described by Williams are in reality hemorrhages into the preformed empty cavities. Very recent microscopic examinations demonstrate that such hemorrhagic apoplexies into empty cavities have three zones: first, a central zone formed exclusive of red blood cells; second, a fibrinous reticulum around the central zone; and third, an external zone of degenerated villi with strongly dilated vessels, some of which have ruptured. While the author states that placenta infarcts may form around the hemorrhagic apoplexies, he does not believe that they ordinarily form that way. His reason for this opinion is that while white infarcts are found in placentae of every age, he was unable to discover any irregular cavities in twenty very young placentae, nor any remains of such cavities in white infarcts found in old placentae. I can recall several cases that have occurred in our practice that seem to bear out clinically somewhat the findings of Dr. Rucker, though I must confess the diagnosis of placental infarcts was not made, but rather they

were classified as toxemia of pregnancy. If you will bear with me I shall give you a brief summary of one or two of these cases:

Mrs. H., age 22, had a negative family and past history except one previous pregnancy. Thought she had some "kidney trouble" at that time. She went to term and had a normal labor with a still-born child. She reported to me May 4, 1920. Her physical examination, including blood, Wassermann, urine and blood pressure, was normal. Two weeks later she had a case of albuminuria; her blood pressure was 120. On May 28 the urine was normal, blood pressure 125-70. At this time she complained of some "indigestion." She continued to report to me weekly until July 15, during which time she seemed to be doing very well. One week later there was some edema of the feet and ankles, with a faint trace of albumin in the urine, but no casts. Her blood pressure was 140-90. A renal functional test was done at that time and the findings were 35 per cent the first hour and 30 per cent the second hour. Her labor began two days later at 4 p. m. and she was delivered within three hours. The child was still-born. There was a large red infarct occupying about one-third placentae. I should have stated that the fetal heart was heard distinctly the day preceding the labor.

Mrs. S., age 42, had a negative family history. Past history showed that she had never been sick. She had had one pregnancy nine years previously and it resulted in a normal birth. She reported for observation August 5, 1920. Expected date of confinement, November 11, 1920. Her condition was normal until October 1, at which date her blood pressure was 150-105. The urine was normal at that time, although there was slight edema of the lower extremities. On October 4 she had a severe headache, which was relieved by two five-grain doses of aspirin. On October 9 there was considerable albumin in the urine, but no casts. Her blood pressure was 160 systolic. She was sent to the hospital for observation. 'Phthalein test showed 31 per cent in three hours. There was some acetone in the urine, but the microscopic examination was negative. On October 11 her blood pressure was 160 systolic. The urinary findings had not changed. However, she insisted that she did not feel badly. On October 13 she developed some nausea, her headache reappeared, and her blood pressure was 170-118. The fetal heart sound was not so forceful as on previous days. The induction of labor was advised, to which the patient and her family agreed. A Voorhees bag was inserted under nitrous-oxid-oxygen anesthesia. The bag was expelled at 7 p. m. and a living male child was delivered at 11 p. m. The birth weight was four pounds eight and one-half ounces and it is doing well at the present time. The mother is doing well except for a faint trace of albumin and is consequently still under observation. The placenta in this case showed a dark red infarct about two inches in diameter situated near the center of the organ.

Dr. Rucker's paper seems to be a very timely one and should impress upon us the fact that placental infarcts occur very much more frequently than is usually supposed.

Dr. Otto H. Schwarz, St. Louis, Mo.—The obliterative endarteritis of the placental vessels is given as the primary lesion concerned in the formation of white infarcts. Recently in studying several cases of missed abortion, in which cases there were found obstructive lesions in the cords in the form of true knots and twists, there was definite infarct formation in the placentas of each of these cases. In some the entire placenta showed a picture analagous to white infarct formation. With complete obstruction of the cord, the entire placenta appeared as a white infarct. In ordinary white infarcts of the placenta, the degree of infarction might depend upon the number and size of the vessels which become obstructed in some manner, and subsequently become obliterated.

Dr. J. R. Garber, Birmingham, Ala.—I should like to ask the essayist if he has ever observed the occurrence of uterine contractions, over a long period of time, in cases of abruptio placenta? I recall two cases. In both instances the patient was a graduate nurse and the wife of a physician. Very definite uterine contractions occurred at regular intervals for a week before delivery. In one instance the patient developed eclampsia, while in the other labor was uncomplicated. In both cases there were well marked areas of infarction in the placenta and a diagnosis of such condition was made prior to delivery. It seems to me that such disturbance in the placenta would cause these contractions and I should like to hear Dr. Rucker's experience in this connection.

Dr. Rucker (closing).—I believe with Dr. Byrd that we are missing some of the cases that we can diagnose if we watch our cases more closely in the last part of pregnancy. In regard to the question raised by Dr. Schwarz, we are in the dark as to the etiology of this condition. We know that it is due to an endarteritis of the villi. But what causes the endarteritis? It is usually said to be due to some unknown toxin, which is the same as saying we do not know. I am glad to have this suggestion from Dr. Schwarz that knots and obstructions in the cord may be responsible and shall watch the cord with that in mind. In regard to Dr. Garber's question, in one of my series and in the case that I reported with retained placenta, there were vague abdominal pains. When labor pains began, whether spontaneously or induced, the pains were in no wise different from an ordinary case.

EYE, EAR, NOSE AND THROAT

SOME FUNDAMENTAL CONSIDERATIONS IN THE FUNCTIONAL EXAMINATION OF THE EAR*

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At first glance it would seem that the subject I have chosen has been so thoroughly considered that not much remains to be said.

Observation has convinced me that functional examinations of the ear are often made somewhat perfunctorily and without due consideration of all the elements concerned. It is my hope to arouse your interest in a few of the details involved—details which exist in your memory but are used too infrequently in practice.

Many points of analogy exist between the functional examination of the eye and the ear. We have a field of hearing just as we have a field of vision. A fixed visual range has a corresponding audition range. The macular area, the most sensitive portion of the retina, corresponds to that most sensitive area of the organ of Corti which we usually associate with the hearing of normal speech. We have islands of deafness just as we have scotomata. Certain retrobulbar affections have their analogues in retrolabyrinthine conditions, and the intracranial pathways of the second and eighth cranial nerves present many points of analogy.

In the functional examination of the eye the ophthalmologist has a decided advantage over the otologist in the functional examination of the ear. In the examination of the fundus he sees the optic nerve, whereas the otologist views only the external auditory canal and the drum membrane with its landmarks. The otologist will never see the auditory labyrinth. He must be satisfied to infer its condition from tests which are largely subjective. The organ of hearing is more sensitive than the organ of sight, but a comparison of the methods of their examination reveals how crude, inexact and untrustworthy are the procedures at our command for the estimation of auditory acuity. Such a comparison emphasizes the great need of a reliable, accurate, practical system of acoumetry. The ophthalmologist has been able to wring more from physiological optics than the otologist has from acoustics.

As a further illustration of the sensitiveness of the ear to its proper vibrations, it has been stated that if the chemical energy employed by a blade of grass in the process of growth could be converted into sound it would be possible to hear it grow. The main difficulties in the functional examination of the ear are of two kinds which arise from the type of function examined and the standardization of one's technic in the method and manner of examination. We do not examine auditory sensation as such, but rather obtain the measure of energy employed in producing a sound which can just be appreciated inferring that auditory power is in inverse proportion to the intensity of the stimulus. Based upon this premise an attempt has been made to divide tests of auditory power into two separate and distinct varieties, viz: (a) qualitative, and (b) quantitative.

When we speak of quantitative examination we mean the estimation of the auditory power for the perception of certain given tones; or, in other words, the least intensity at which these tones will produce an excitation of the auditory organ. By qualitative examination is meant the capacity of the auditory organ to perceive tones of different pitch including the highest and lowest tones encompassed within the range of hearing. Both the quantitative and qualitative determinations must go hand-in-hand and cannot well be considered as distinct from each other. The methods in vogue for the qualitative examination of the hearing often lead to unreliable results because they fail to take into account the element of intensity.

In recent years the complexity and difficulty of the examination of the vestibular apparatus have been added to those of the scientific phase of the examination of the cochlea. Hencforth we must con-

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

sider the ear as the organ of hearing and equilibrium. Because of the difficulties mentioned, accuracy has been too often sacrificed upon the altar of convenience, especially in regard to testing the ear by speech, the watch and the acoumeter.

The speaking voice tests the ear in its chief function, but of all the methods of examination it is the least accurate because no uniform standard of intensity is possible. The singing voice of the average individual covers about two octaves; the average speaking voice, that of a few semitones; whereas, normal audition extends over a range of about eleven octaves. Voices differ markedly in pitch and quality due to the presence of harmonics. We can not more than approximately determine the dynamics of the voice. The carrying power of the ordinary conversational tone varies with individuals and even at different times in the same individual. The use of words, phrases and sentences is so often influenced by education, training and age of the person examined that the findings from their use are not trustworthy. The auditory value of words depends upon the letters of which they are composed. Wolfe arrived at rather startling conclusions regarding the hearing distances for different letters. The sibilant "S" was heard at 175 meters and the lingual "R" at 40 meters. Vowels were heard better than consonants. The most important tone range for the speech test existed between B and G in which most of the vowels lay. The aspirate "L" was heard at less than 10 meters, whereas "A" as in father was heard at over 250 meters. Again, in the use of the voice one can not eliminate so readily contra-audition from the other ear if good hearing exists therein. All these arguments make a good case of the many disadvantages of the voice as a measure of auditory acuity. The whispered voice has some advantages over the ordinary conversational voice, but it is likewise open to the same disadvantages of inaccuracy and unreliability. The watch and acoumeter have neither a uniform intensity nor pitch to recommend them, and their use should be discouraged.

Various types of audiometers have been devised, but none of them so far has been practical enough nor sufficiently free of objections to gain general adoption, although the Seashore type described and used by Dean has much to recommend it. The audiometer is a type of apparatus set at a fixed distance from the subject in which the intensity of sound is varied by an increase or decrease of the physical energy producing it. The Seashore apparatus is operated electrically and gives a range of 30 v. d. to 10,000 v. d.

The aforementioned methods of examination of the hearing depend upon air conduction. In the use of tuning forks and the monochord either air conduction, bone conduction, or a combination of both are employed. The tuning fork, being an instrument of defined pitch, of relatively pure tone with few harmonics which are far removed from the fundamental tone and cease quickly, appears at first glance to be ideal for auditory mensuration, but it is likewise open to objections. The varying intensity of forks of different pitch and vibration, interference from within and without the prongs, constitute the greatest drawbacks in their application in quantitative and qualitative examination of the auditory function.

Three methods for the estimation of intensity are in vogue: (1) uniform initial intensity is attempted by a uniform initial physical impact; (2) estimation of intensity from the amplitude of vibration; and (3) inference of intensity from the duration of vibration.

Harmonics which tend to cover the fundamental tone are proportionate to the physical force employed in setting a fork in vibration. Overtones can be kept at a minimum by striking the prong near its middle gently with a covered hammer. Even if a uniform physical impact were possible, objections arise because the effect is different with each fork and the intensity must be estimated by varying the distance or counting the time of vibration. According to some authorities sound energy is in direct proportion to the square of the amplitude. It is only possible to estimate intensity from amplitude in forks of low pitch and above the second octave amplitudes are indeterminable. The third method, duration of perceptible vibration, is in common use, but

is open to the objection that intensity of sound diminishes with distance geometrically and not arithmetically. The loss of intensity is, therefore, not directly proportionate with time and is different for forks of different pitch.

Percentage values of the auditory perception of the tones of tuning forks can be accurately ascertained according to the method of Dundas Grant and described by him at the Ninth International Otological Congress. Low tuning forks vibrate for a long time with feeble intensity because the amplitude of the vibrations is wide and decreases slowly; whereas, high forks vibrate a short time with great initial intensity because the amplitude of the vibrations is short and powerful and the time rate of decrement is very rapid.

The normal ear hears by air all the tones from C.2 (16 v. d.) to the eighth octave, inclusive (25,000 v. d.). These various tones are best produced by the Bezold-Edelmann tone series which consists of eleven forks, two whistles and a Galton-Edelman whistle, the latter having two adjustments, one for lengthening the whistle and the other for controlling the width of the whistle aperture. The two whistles bridge over the space between c.5 (4,096 v. d.) and the Galton whistle. The forks are weighted to eliminate overtones and vary pitch. The capitals carry their designations at the bottom and the small letters at the top. The mark on a weighted fork applies to the vibrations of the fork with the weights off. Instead of the Galton whistle the monochord may be used for testing the high tones, and it has the added advantage that testing can be done by both air and bone. The notations can be made in terms of length of the wire or in vibrations. The highest tones of the monchord are heard better by bone conduction than by air conduction.

Among the special tuning fork tests we have the Weber, Schwabach, Gelle, Stenger and Rinne. The former three are too well known to deserve more than mention. The Stenger test, made with the small "a' " fork, is our best test for malingering and its mere mention also suffices. I would, however, call your attention to some important details regarding the Rinne test, which is probably our most valuable one. Its value is largely due to the fact that better and more distinct answers can be obtained from the average patient.

The average text-book instructions for making the Rinne test are somewhat misleading. Most authors describe the test as giving either a positive or negative result. We should attempt to determine whether air conduction is normal; whether bone is normal, and in which course of conveyance exists the defect or greater defect in hearing. Results depend in a larger measure than is usually appreciated upon the pitch of fork used and the manner of applying the test. The lower the pitch of the fork the greater the tendency to a negative Rinne, and the higher the pitch of the fork the greater the tendency to a positive Rinne, is the rule; because a low fork is better heard by bone conduction and the high fork by air conduction. Sonnenschein has stated that air conduction as compared with bone conduction is much greater than ordinarily assumed, referring to an experiment made by Bezold in his classic on the functional examination of the hearing.

Bezold gives the figure of normal air conduction as about thirty seconds longer than bone conduction in normal positive Rinne if the a′ fork is used. If, however, the fork is held before the external meatus alone, without having been previously placed upon the mastoid, the duration of air conduction is much longer than when the usual Rinne is performed, viz., seventy to eighty seconds. This is due to the fact that the vibrations of the stem of the fork are not damped by being placed upon the mastoid. If, after the fork is no longer heard with the prongs before the meatus, after having been previously placed upon the mastoid as in the usual Rinne, the stem is placed into the auditory canal the fork is again heard by air and usually for a period of twelve to thirteen seconds. In the usual Rinne, if positive, this procedure may offer some assistance.

We have eight or nine varieties of Rinne reactions:

1. There exist two types of positive Rinne (a) positive in which A. C. > B. C., but both normal in duration (this is the normal Rinne); (b) positive Rinne A. C.

> B. C., but both shortened (found in internal ear disease with impaired hearing).

2. There exist three forms of negative Rinne: (a) B. C. > A. C., the A. C. being moderately diminished (found in ordinary middle ear disease); (b) B. C. > A. C., but both diminished (found often in combined internal and middle ear disease); (c) B. C. > A. C., but both very much shortened (found in far advanced ear disease because A. C. is lost more rapidly than B. C.).

3. Indifferent Rinne (≠), of which there are two varieties: (a) A. C. = B. C.; the A. C. is slightly diminished, the B. C. slightly increased; hearing good; found in slight middle ear disease; (b) A. C. = B. C., but both shorter than normal; hearing poor; found in advanced internal ear disease.

4. Infinite Rinne (∞), of which there are two varieties: (a) if not heard by air but somewhat by bone we have the so-called infinitely negative Rinne; present often in far advanced internal ear disease; (b) if not heard by bone but somewhat by air we have the so-called infinitely positive Rinne.

Bezold used the A. (108:75 v. d.) and a')435 v. d.) forks in his work with the Rinne test, and drew the following interesting conclusions: in all bilateral diseases of the ear where the difference in the hearing of the two sides is not too great, the negative Rinne indicates a change in the conducting apparatus; but the converse does not always obtain, for a shortened or even positive Rinne may be secured: (a) in chronic conditions where otoscopic and catheter findings are negative and hearing for whisper is above one meter; and (b) in acute or subacute otitis media with exudate in tympanum and a marked diminution in hearing. In a severe unilateral affection the Rinne may be negative even though the conduction apparatus is intact. When a positive Rinne is of normal duration or only slightly shortened and the hearing greatly impaired, but the otoscopic and catheter findings are normal, then any material involvement of the conduction apparatus may be excluded regardless of the unilateral or bilateral character of the condition present. Findings are more definite with A. (108:75 v. d.) than a' (435 v. d.) since duration of negative Rinne is always longer. This explains the fact that in a shortened positive with an a' fork the test with an A. fork may show a short negative. The contrary is never true, viz., a positive Rinne with A. when it is negative with a' fork.

I have purposely gone somewhat into detail regarding the fundamental principles controlling the "tools" with which the otologist works in examining the cochlea because the usual perfunctory examination can be traced to their neglect. There has been in the past little attempted in the standardization of hearing tests, although a few schemes exist for recording findings, the most common in vogue being perhaps that used in the old Politzer clinic. The usual examiner "uses as few forks as he pleases with results far from pleasing."

For the past few years I have been using the hearing tests as elaborated by Randall for routine work supplemented by the use of the White noise apparatus in determining bone conduction for each ear. For the Randall tests A-1 and a' forks of 50 and 200 vibrations respectively and a c4 fork are used. These give the low, middle and high tones, and one obtains a good idea of the hearing range. The forks are permitted to drop their height and weight against the knee. The Roosa modification of the Rinne test is employed with the Gardner-Brown test, which gives a Weber and Schwabach at the same time. The Politzer test determines the patency of the Eustachian tubes.

The findings are tabulated according to the following scheme:

A-1 A c4 Ac Bc N Pol Galt W
A-1 A Ac Bc N

which is kept for use as a rubber stamp. For testing bone conduction the c2 fork is used, contra-audition being eliminated by tuning the White noise apparatus to the proper intensity to exclude the ear not being tested.

In the functional examination of the vestibular apparatus we are more fortunate in possessing a fairly well standardized technic, findings being recorded on a Jones-Fisher chart. Technic is of great importance and one must not attempt to do too much at one sitting, as the patient

may "go to pieces" and refuse to proceed with the completion of the examination. For the turning tests a turning chair with a proper head rest and a stop pedal is necessary. For the caloric test the water used should be at the proper temperature as it enters the ear of the patient—68° in using cold water, and 112° F. in using hot water. I assume that the technic for the examination of the vestibular apparatus is well known to all of you, so I shall refrain from describing it.

In regard to the galvanic technic, a few essentials are always in order. An accurate milliamperemeter with a pole changer is necessary; also an assistant to control the current and its polarity, the latter being unknown to the examiner until designated by the direction of the nystagmus developed. The electrode should not be placed upon the mastoid, as described by some authors, but rather against the moistened tragus which is forced against the external auditory meatus with the cotton covered ball of the saline-moistened electrode. The nystagmus developed by the galvanic current differs from that obtained in the turning and caloric tests in that its amplitude is quite small. It is a slight rotary twitch which must be closely observed to notice its first appearance, which occurs in the normal with about 4 milliamperes of current.

The galvanic technic requires great attention to details and everything depends upon accuracy in its application if trustworthy results are to be obtained. It is our only way of differentiating a labyrinth from an eighth nerve lesion. After the examination is completed the vestibular findings should always be studied and interpreted with the tests of the cochlear portion of the eighth nerve.

We as otologists owe it to ourselves and our patients to make the best of our methods in the functional examination of the ear. "Careful routine is ever a better workman than careless disregard." It is only by careful routine that we may arrive at an accurate diagnosis and institute correct therapeutic measures.

In closing I wish to make a plea for more careful routine in the functional examination of the ear.

808 *Francis Bldg.*

DISCUSSION

Dr. Louis Levy, Memphis, Tenn.—I am afraid it is only too true that often we are negligent in our work in testing the ear. There is no doubt in my mind that oftentimes if we put these patients through a careful examination we would not only save their hearing, but would give them the early treatment that is no doubt necessary. The Barany tests give us an insight not only into the labyrinth, but, I think, aid us in the diagnosis of eye conditions. I have had the pleasure of talking to Dr. Dean about his audiometer, and I had hoped by this time that he would have it perfected, because I believe with some such instrument we shall be able to chart out our islands of deafness just as the perimeter charts scotoma in nerve lesions of the eye.

As to the use of tuning forks, in our Clinic we found it very hard, especially with the negroes, to get the value out of them that we desired. As a rule with your white patients of average intelligence it is rather easy to go ahead with your forks; but the men working in the Out-Patient Department, which is chiefly among negroes, use the tuning forks and they, like myself, have not been able to get the true value of these tests in these cases. In the office we try to work along the same line, but there naturally the personal equation enters. Especially is this true in a noisy office, so we must do everything in our power to exclude noise. We use the Gradenigo and Hartman forks, the Gradenigo because with them we can watch the vibrations and time the hearing more easily. These, therefore, give an added value which the plain fork does not, owing to the fact that ofttimes a patient claims to hear forks long after they have ceased vibrating.

The real test of the hearing is not complete in my opinion without the Barany test. I always use it, and when a patient complains of dullness of hearing, my routine practice is to make a Barany, not always complete but enough to tell whether or not the labyrinth is in normal condition. The galvanic test I have not had much use for. As the Doctor said, the only value is the differentiation between the eighth nerve lesion and the labyrinth itself, and if we have not made sure of the condition of our labyrinth it may give us a reaction through the nerve by jumping over the dead labyrinth. I do not think Dr. Heitger need call his paper a repetition, but rather a warning to us to be more careful in our examination.

Dr. George Maxwell, Roanoke, Va.—A great many of you were in the Service and you know the variation in the findings of the different men was very noticeable. I have also been doing special work for the Bureau of Pensions, and the tests which are laid down in their book by which you are to judge whether a man is deaf in one ear or not are so absolutely ridiculous and absurd that I wrote them if they expected me, as an expert in the examination of ears, to sign my name to findings according to their rule, they could take my name off the list. For instance, they say to determine whether a man is completely deaf in one ear, stop up the good ear, and if he can not hear loud conversation at three feet, he is absolutely deaf in one ear. Any man knows that you could stop up both ears as tightly as possible and a man with good ears could hear

me talking now if he were ten feet away. We need not only more system in office work, but we need to impress upon the Government the importance of having some standard that is worth while. Let us model our work to fit into that.

Dr. H. W. Lyman, St. Louis, Mo.—I want to emphasize what Dr. Heitger has said about the practicability of the tests suggested by Dr. Randall. We have been using them for a number of years in our Clinic, and they are much quicker and more accurate than the tests we formerly used. It is quite possible in a few minutes to get a very accurate idea of the condition of auditory apparatus. Of course we can not use the Bezold forks in every case because of lack of time, but we can use a practical test that takes only a few minutes and gives an accurate idea of the hearing.

We do not advocate a routine Barany examination in all cases, but in cases of vertigo we at least test the nystagmus in each direction. This is of special importance clinically in cases of focal infection, which will show a variation in the normal nystagmus. In the early stages there will be an increase, and later on a diminution of the twenty-four seconds of nystagmus which a normal labyrinth gives.

This test should be used in all cases where we suspect focal infection, and in any case complaining of vertigo.

Dr. M. F. Arbuckle, St. Louis, Mo.—There is one point which has not been emphasized. I should like to remind the general practitioner and the neurologist of the value of these tests as an aid to a diagnosis.

The localization of many brain lesions is facilitated by the employment of them.

Dr. J. A. Stucky, Lexington, Ky.—I should like to ask Dr. Heitger to elaborate one point: that the most practical part of these tests for the otologist is the aid in ascertaining whether the disease is functional or organic. That is a point that I am sure from the expression of this interested audience they did not clearly grasp.

Dr. Heitger (closing).—Referring to what the Doctor has said, of course I realize that in a short paper like this it is impossible to get in all the things one would like to say, so I have left out a good many. My purpose is to rouse interest in this subject.

Dr. Levy spoke of the noisy office, and that is probably one of the greatest difficulties—getting rid of adventitious sounds. We can not all have sound-proof testing rooms for our routine cases. Recently I planned such an office in which I have an inside corridor thirty-two feet long that can be closed off from the surrounding offices in such a way that when the doors are closed it is almost sound-proof. It is surrounded by two walls with a large air space between.

As to the audiometer that Dr. Levy mentioned, that is being worked out by Dr. Dean and his associates and is of the seashore type. He says they hope in a short time to have this instrument on a practical basis. Of course the great trouble they hope to overcome is the fact of the adventitious sounds of the electrical apparatus. They are working at present to eliminate these sounds and when this is done we hope to have an apparatus that will give us a method whereby we can chart the hearing of our patients just as the ophthalmologist can chart the visual field. Of course when we have that we shall have a method that is far more accurate than anything we have had in the past.

In regard to the ordinary routine Barany in connection with the routine examination of the cochlea for practical work, as Dr. Lyman stated, the doctor can turn his patient and get the nystagmus in both directions, but we must be careful with the average patient. It seems that a great many patients know about the turning chair and they have all sorts of vague and weird ideas regarding its effect; and if you try to do too much of the Barany test at one time you will probably make the patient seasick and the result will be that he will not come back.

Dr. Maxwell spoke of the inaccuracy of the tests as employed by the aviation examination, and particularly in regard to the unilateral deafness. We have one very excellent test that will rule out practicallv all inaccuracies, and that is the Stenger test. Two small forks are used. It is based upon the principle that the small a' fork will not conduct sound through the head from one ear to the other by air conduction, that where one fork is placed nearer the ear it drowns out the sound of the opposite fork. In using this test the two forks are used, the patient is blindfolded and the examiner stands behind the patient. The distance is varied and the patient asked what he hears, or whether he hears at all. He may not answer, but when he gives an answer it stamps his condition absolutely. I think we have in the Stenger test a most accurate test for unilateral deafness.

You know this, that you can read the report of an examination for hearing that some one else had made and when you get through you have not the least idea what the patient's hearing is, for the simple reason that the method used does not state whether the fork was weighted or not weighted; and there are so many inaccuracies that when you finish you are as much at sea as when you started. What we need is a practical method for the examination of our patients so that when a man in New York makes an examination a man in San Francisco reading it will have a definite idea of the patient's hearing. When the ophthalmologist says the vision is 20/20 every other ophthalmologist knows what he is talking about, he has a definite idea of the patient's vision, something we do not have when we read the examination of another man on the hearing.

Dr. Arbuckle spoke of the intracranial condition. Of course we do not know the intracranial paths of the cochlear and vestibular portions of the eighth nerve so well as the ophthalmologist, and the reason is that we have not worked it out as they have. If we were to work these things out routinely, and then get together in meetings from time to time and

discuss them, we would get somewhere. Along that same line I wish to mention the work of Gradenigo and Holinger, of Chicago.

In practically five minutes you can give the average patient the Barany test, and in a short time this routine test should be repeated. It is very important that hearing tests and tests of the vestibular apparatus be made repeatedly. These tests are merely routine. They are not intended to be a complete examination, but to assist, and if further examination is necessary they will point out the way. In the average routine Barany test we can get the nystagmus to either side and test once for the falling test. With the average patient, if you attempt to give the falling test twice, you make him seasick and nervous. You have to feel out your patient. You can do less with the normal patient than the pathological patient. In the differentiation of your labyrinth from the eighth nerve the galvanic test is very important and can be done in a few minutes. It is rather interesting when you look over the literature of the Continent and the literature of this country, and the hospital reports, one finds few reports of VIIIth nerve involvement, yet Politzer states that the VIIIth nerve is more often affected than all the other cranial nerves. We find very few cases of neuritis of the VIIIth nerve reported because the routine examinations are not carried out.

INTUBATION VERSUS TRACHEOTOMY IN LARYNGEAL DIPHTHERIA*

By John H. Foster, M.D.,
Houston, Tex.

A number of years ago I should have considered discussion of this subject superfluous. O'Dwyer was hailed as one of the great benefactors of the human race and it was almost universally conceded that the only excuse for a tracheotomy in dyspnea from laryngeal diphtheria was the inability to get any one competent to do an intubation. Of recent years, however, I have noticed a tendency for the pendulum to swing back, and following the teaching of a few men of some prominence an increaing number of younger men are today advocating tracheotomy as a routine procedure rather than intubation. With this position I can not bring myself to agree, and it is for the purpose of bringing out the views of the laryngologists of this Association and provoking a lively discussion of the subject, that this short paper is presented.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Fourteenth Annual Meeting, Louisville, Ky., Nov. 15-18, 1920.

I shall not insult the intelligence of this Section by going into an historic account of the development of the various methods of dealing with urgent dyspnea. Fortunately, the necessity for any interference on our part in laryngeal diphtheria is lessening year by year as the general physician is becoming more alert in suspecting and detecting this condition and more prompt in administering antitoxin in sufficiently large doses to obviate severe dyspnea. Unfortunately, on the other hand, a sufficiently large number of neglected cases demand quick relief to make the handling of them in the best possible manner a topic of very lively interest.

In order to get the opinion and results of a large number of representative laryngologists, the writer sent out letters to a hundred men asking them to answer the following questions:

1. Do you use intubation or tracheotomy as a routine in cases of laryngeal diphtheria requiring relief from dyspnea

2. What are the reasons for your preference?

3. In how many cases have you found tracheotomy successful in saving the patient when intubation failed to give relief?

Sixty-five answers were received and I wish here to thank these men for responding so promptly, and in some cases so fully and interestingly. Of the sixty-five responses, fifteen laryngologists for various reasons do not handle these cases. Of the remaining fifty, 14 per cent prefer tracheotomy, while 86 per cent prefer intubation as a routine procedure.

Let us take at first the various reasons given by those who prefer tracheotomy. Four reasons are stated:

1. Greater assurance of relief.

2. Danger of intubation tube becoming stopped up by loosened membrane and patient asphyxiating.

3. Danger of patient coughing up the intubation tube and suffocating before any one capable of reintubating can be summoned.

4. Danger to the integrity of the larnyx from pressure of the tube.

On the other hand, the advocates of intubation advance the following arguments:

1. Simplicity and ease of intubation.

2. After-care less troublesome than after tracheotomy.
3. Less shock.
4. No scar.
5. Shorter convalescence.
6. Parents do not demur at intubation as they do at any cutting operation.
7. Mortality lower, especially in view of the danger of sepsis and pneumonia following tracheotomy.
8. Less danger of permanent laryngeal stenosis.

Personally, I do not think that the arguments in favor of tracheotomy are well taken or, at least, that they are sufficiently strong to establish tracheotomy as a routine procedure.

My experience covers a period of fifteen years and embraces several hundred cases; and I have never seen a death due to the tube becoming plugged up by membrane. In a fairly large number of cases I have seen membrane pushed down by the introduction of the tube and the patient's breathing become cut off. This is particularly apt to happen where the patient is too exhausted to cough vigorously and expel the membrane. It is then necessary to remove the tube and allow the loosened membrane to be coughed out. The tube is then replaced with entire relief. The force that can be exerted by the lungs through the rigid intubation tube is enormous and if the patient has passed the critical stage presented when the intubation is required and done he can as a rule cough out the loosened membrane through the tube.

The danger due to coughing out the tube is, I think, greatly exaggerated. This may be greatly lessened by introducing a full sized tube in the first place. As you all know, in coughing there is a tendency for the vocal cords to come together in an almost spasmodic action which tends to hold the tube firmly in place. At times when the membrane separates and the edema of the larynx subsides, the tube is coughed out; but as a rule then it can be dispensed with. In cases in which it was necessary to reintubate, the emergency was not so great that the physician could not be sent for and have plenty of time. The only exception to this rule in my experience was in a rather atypical case of dyspnea which was treated as laryngeal diphtheria although the cultures from the throat were never positive for Klebs-Loeffler bacilli. Only a very small tube could be introduced. The dyspnea was relieved, but on the second day the tube was coughed out and the patient died before aid could be summoned, although the patient was in a hospital. But granting that such an accident may happen in 1 per cent of cases, I do not believe that even then the mortality will be so high as may be cited against emergency tracheotomies. I have seen a number of patients die while the surgeon was excitedly trying to do a tracheotomy and losing several minutes of valuable time.

As to the sureness of getting relief from a tracheotomy as distinguished from intubation, I think a good deal of misapprehension exists. Few people seem to realize how deeply an intubation tube extends into the trachea, but I assure you that it goes quite as far as does the ordinary tube in the average tracheotomy. Of course if a very low incision in the trachea is made and a long tube is used, it will extend lower than the ordinary intubation tube, but I am speaking of the work as ordinarily practiced. A very low tracheotomy is not an easy operation and a high one is usually done in emergency cases and the ordinary tracheotomy tube used.

In this connection I can not forbear to quote an extract from a letter from Dr. H. L. Lynah who, as you all know, is one of the best authorities in this country on this subject. He writes:

"I have never seen a case relieved by tracheotomy when an intubation failed to give relief. These cases should not be classified as laryngeal diphtheria, but as tracheo-bronchial and pulmonary diphtheria. Bronchoscopy and very long bronchial tubes or tracheal canulae will afford relief, but this is only temporary. The obstructing foreign body membrane should be removed by bronchoscopy, the bronchi swabbed with antitoxin and then a long intubation tube introduced. In my experience chronic stenosis of the larynx and trachea has followed tracheotomy just as often as it has followed intubation."

To this I can only add my endorsement. Some years ago I was called to see a young man whose family were Christian Scientists. He had had no medical attention until the dyspnea was severe. The physician who was called in turn called me, and when I walked into the room he remarked: "I am afraid you are too late. He is

about gone." An intubation tube was introduced in a moment with only slight relief. I then did a tracheotomy and with forceps removed a membranous cast of the trachea with a bifurcation showing extension into the bronchi. The patient regained color and consciousness and after the administration of a large dose of antitoxin seemed in a fair way to make a good recovery. The next day the bronchi seemed to fill up completely and the patient presented the typical picture of a severe case of broncho-pneumonia and promptly died.

I shall not argue with any of you who say that under certain circumstances a tracheotomy is to be preferred to intubation. I think myself at times when we are called off to some remote place it may be safer to do a tracheotomy; but this, on the other hand, certainly does not constitute an argument for the routine use of this procedure.

In reply to the argument that chronic stenosis of the larynx is seen after intubation, I grant that it is occasionally seen, but I do not grant that it is due to intubation. I have seen two cases where tracheotomy was done and not intubation, which is a much larger proportion when we consider how many more intubations are done than tracheotomies. If you will talk with those who observed these cases in preintubation days, you will find how common it was then to see patients who became permanent "tube cases." And this is natural. The treatment for these cases of partial stenosis is to put rubber or silver tubes in place to open the larynx and the intubation tube fulfills this function.

DISCUSSION

Dr. R. C. Lynch, New Orleans, La.—I might say at the start that I am a rank tracheotomist and not an intubationist, so we hold practically diametrical views. And it would seem to me, taking Dr. Foster's paper sentence by sentence, that there is quite as much in it in favor of tracheotomy as of intubation. We have had our fights on this subject before and we are still the best of friends, and will be when this discussion is over.

Certainly intubation has received the endorsement of America from the very start and has a great deal in its favor, and I believe if we were to boil it down it is the operation of selection, even in diphtheria cases. I have six patients under my care now who have tracheal stenosis. All came with a letter from the doctor, and one letter would explain five of these six cases. The doctor says that this patient was taken ill with tracheal stenosis and dyspnea; he was called to see him and intubated and the patient got along splendidly for two or three days. Then the tube was coughed up. He reintubated, and this performance was repeated three or four times. Finally, it was necessary to do a tracheotomy, and after a week or ten days when the active symptoms subsided, he tried to take out the tracheal canula and could not get it out. So the patient was sent to me for relief. We found an absolutely complete stenosis, but usually were able to get a filaform through. Then it takes from six months to one and a half years to regain the lumen over the larynx and in the meantime the child is subjected repeatedly to anesthetics. And if it goes through the year and a half of operative treatment without secondary pnuemonia or intercurrent conditions, the chances are it will always have a more or less incompetent voice. When one sees these cases time and again, one wonders whether or not the intubation has anything to do with it. I have one case, out of the six which are at present under my observation, who had a primary tracheotomy. So it is a fact that tracheal stenosis can occur in the midst of a tracheotomy just as well as in the midst of an intubation tube. So while the intubation tube may be responsible for stenosis in a great many instances, it may not be responsible in all of them, as Dr. Foster mentions in his paper.

Of course, we could discuss the possibilities of indirect intubation, that is, by the old method. But as to which is the more simple, an intubation or a tracheotomy, it depends upon the operator, whether he has sufficient experience to do an intubation, or whether he has been educated to do a tracheotomy. In my own hands a tracheotomy is more rapid and certainly more satisfactory than intubation. My experience at the present time covers about eighty-five cases. I must admit I am not doing them now nearly so much as at first. I do not see a case of tracheal diphtheria nearly so often as I did five years ago. The most of my experience was gained over five years back, and not over five years up to the present time. At that time we took a great many patients to the hospital who had this complication of diphtheria and we never lost one from tracheotomy. One of them had pneumonia following the tracheotomy, which is the thing that is always mentioned in the text-books. It is the bugaboo that hangs over the doctor from the minute the tube is inserted. Regarding these patients who got well, we were not over confident for them at the time the tracheotomy was done. If they died, they died from diphtheria, not from the tracheotomy, and if they got well, they had tracheal stenosis. The functional results were satisfactory. One of the patients we did an intubation upon coughed up the tube. It was replaced and he coughed it up again. At present this child has a perfect voice but he had to keep the canula in his throat for over two years.

In cases of bronchial lesion we find, of course, the tracheotomy helped us in getting rid

of the tube, and it was the general impression of the men around the table that a tracheotomy was best on account of the secretion in the trachea. Of course a tracheotomy will relieve in every instance where any artificial passageway or instrument is used to get air into the pulmonary pathway. The child is all choked up and when the tapes are tied tight around the neck then the tube can not be coughed up. I have heard a number of deaths reported from coughing up the intubation tube. In New Orleans I know of six deaths which have occurred (not in my own practice). None of these cases has been reported because the tube was coughed up and no physician could get to the child before suffocation occurred.

In cases of sub-glottic catarrhal laryngitis, to me it is almost impossible to make a differential diagnosis. I take it for granted it is diphtheria. But in these cases in my opinion the presence of the tube spells disaster, and it is in those cases that stenosis occurs following the presence of the tube.

Certainly in no other place in the body do we insert a tube in the midst of an acute, active inflammation and expect the inflammation to subside in the presence of that foreign body without stricture following.

Dr. E. W. Carpenter, Greenville, S. C.—Laryngeal diphtheria does not cause dyspnea as a rule until the sub-glottic space becomes involved. The mucosa in this locality is very loosely attached and the sub-mucous space readily becomes filled with inflammatory exudate.

The laryngologist is usually called into these cases to relieve urgent dyspnea. Generally a diagnosis of diphtheria has been made by the family doctor and the situation in my experience does not permit of a careful investigation of the correctness of his diagnosis.

The situation usually demands immediate action in relieving this dyspnea. The easiest and most rapid method of accomplishing this is to slip in an intubation tube. This is the only feasible procedure in a cabin or private home, no matter how luxurious the furnishings may be. The disadvantage of this advice is that only a chosen few of us ever develop the ability and the facility to do a rapid intubation without traumatizing the parts. I understood the Doctor to say that he had never seen a case of dyspnea which could not be as thoroughly relieved by intubation as by a tracheal tube. I can not assent to this unless the Doctor will qualify the statement by saying that a long direct intubation tube will reach as far down the trachea as a tracheal tube, and this method of intubation was evidently not referred to in his paper.

Intubation should never be attempted without an emergency tracheotomy outfit at hand, because you do not know unless you have done direct inspection whether you have diphtheria, sub-glottic edema or tracheal obstruction. So we should always be prepared to open the trachea if an intubation tube does not extend beyond the obstruction. As a rule in these acute cases the intubation tube does not provide adequate drainage in very young infants. Those who are familiar with this work will recall this disagreeable feature. The presence of the intubation tube in a majority of cases causes more or less trauma.

Now as to the tracheotomy, to try this in a cabin without light and without help is a harrowing experience. It is best in tracheitis cases. In nearly all these emergency cases of dyspnea the obstruction is in the isthmus of the trachea. The indirect intubation tube does not always reach below this edematous area. A tracheotomy in my judgment is best in pulmonary diphtheria. Tracheotomy should be resorted to after repeated indirect or direct intubation. Tracheotomy permits an inflamed larynx to be at rest and resolution is more rapid than when an intubation tube is present.

Laryngeal diphtheria is the reason for which we are most often called to intubate these cases; and in my experience this brings us to the problems of tracheotomy, and these are legion. But I do not believe these come within the province of this paper.

The Doctor spoke of treatment with the "usual" tracheotomy tube. The usual tracheotomy tube, in my mind, should be relegated to the scrap heap. It is a short tube with a fenestrum which encourages granulation tissue to bulge into this window, making the withdrawal of the tube difficult. The end of this short tube impinges against the posterior wall of the trachea and encourages granulations.

Dr. J. A. Stucky, Lexington, Ky.—I think the average case is a law unto itself and the judgment of the operator is the supreme test. Personally, I have had so many fatalities with both operations that I am a middle-of-the-road man.

As I understood the essayist, he said an intubation is a simple operation. That is putting it mildly. Intubation, properly done, is a complex and delicate operation and requires a great deal of skill and technic. I believe that ordinarily I should do an intubation first, especially in a diphtheria case. Intubation is decidedly less spectacular, but not simpler than a tracheotomy, and with the antitoxin for diphtheria that we now have, if we can keep the patient breathing eight or twelve hours we need not leave the tube in longer than that. I believe the mistake that is usually made, especially with myself, is that I have left the tube in too long. I always go prepared to do either an intubation or tracheotomy, and when the nurse gets my emergency set ready she puts in the instruments for both an intubation and a tracheotomy. In several instances where I have had to do a tracheotomy I have been able to save the patient by pulling out part of the pseudo-membranous cast of the trachea. But fortunately we do not have to resort to either operation very often now. I believe there is a place for both operations, but everything else being equal, I should try the intubation first, and if it does not succeed then resort to a tracheotomy. In these cases of tracheo-bronchial diphtheria, we are "up against it."

Dr. Joseph B. Greene, Asheville, N. C.—I want to endorse everything Dr. Foster has said. I find myself on his side and not on the side of my very good friend, Dr. Lynch. My experience has not been so large as Dr. Lynch's, but it has been

so eminently satisfactory that I see no reason for performing a tracheotomy except in the exceptional case.

It seems to me that we as throat men should perfect our technic. It is a difficult technic, but we should perfect it so that pediatrists would not be required to perform the operation. I disagree with the paper as to the rural districts, for I think even there an intubation is to be preferred. We must remember that tracheotomy tubes are also subject to being stopped up. Some of the worse stoppages I have seen were in tracheotomy tubes, and the danger to me is far greater with the tracheotomy tube than with the intubation tube. I make it a rule in rural districts to stay with the patient several hours rather than leave and take the chances of having the tube coughed up; and if the patient gets through one night, the chances are very much against its being coughed up the following day.

In regard to bronchial diphtheria mentioned by Dr. Lynah, of New York, I feel that intubation is as well suited for these cases as tracheotomy. The tracheotomy tube does not pass the bronchial tree and I believe the case would be as well relieved by intubation as by tracheotomy. I am very strongly in favor of intubation.

Dr. Oscar Marchman, Dallas, Tex.—The bloodless operation of intubation certainly has many advantages with the general practitioner over tracheotomy. With the administration of large doses of diphtheritic antitoxin intravenously, we are in a few days ready to remove the tube. We have a bloodness operation and a satisfied family, while on the other hand, if the patient expires during intubation, as sometimes occurs, it is much better than where we have done what might be called a mutilating operation, which we know is necessary sometimes.

I always have my tracheotomy set with me and ready to do a tracheotomy at any time where there is a mass of membrane pushing down into the trachea, which occurs rarely. I have never had it occur in my practice.

The operation of intubation is very simple and even the inexperienced man will have good results. I have found the greatest trouble is that they select a tube not the proper size. Even though they are marked the general practitioner gets careless and does not use the right size of tube.

I realize, too, that when the membrane is low down in the trachea we have to do a tracheotomy, but in the inexperienced hands there is liable to be severe hemorrhage, and then in these fat children it is difficult to get into the trachea. So we are surrounded with the same difficulties in tracheotomy as in intubation. On the other hand, the ulceration at the tip of the canula in a tracheotomy sometimes means infection of the bronchi and lungs. Just a short time ago a case was presented where a tracheotomy had been performed, and when I saw the child he had a general emphysema extending from the site of the incision. Intubation would probably have prevented this severe complication.

A tracheotomy is very prone to be followed by bronchial pneumonia, but I believe with the large doses of antitoxin we are now giving intravenously, that relief follows in twenty-four to forty-eight hours, and we can remove the intubation tubes with very little trouble and thereby save lives more easily and with far less complications than with the old method of tracheotomy.

Dr. W. L. Simpson, Memphis, Tenn.—It has been emphasized several times that large doses of antitoxin early enables us to get the tube out and thus prevent stenosis later. I think that should be emphasized. Really, I have never seen stenosis of the larynx caused by an intubation tube if large doses of antitoxin were given early, and if the doctor understood how and when to take the tube out. Every once in a while some one asks, "How long do you leave the tube in?" Some will leave it in four to five days or a week, but to my mind a man who leaves a tube in four or five days makes a blunder in many cases. If you give forty or fifty thousand units of antitoxin early, then you can begin to try to take the tube out in twenty-four to thirty-six hours. If you do that and know how to reintubate, you will have no stenosis in most cases. I certainly do not see the stenosis after intubation that I do after tracheotomy.

It seems to me there is more danger from losing the patient from stopping up of the tracheotomy tube and lack of experience of the nurse in handling it than there is in stopping of the intubation tube. Personally, I direct the nurse how to clean a tracheotomy tube, for none of them know how. They bring it back to me full of dried secretions after they have been directed to clean it.

Dr. W. T. Patton, New Orleans, La.—Dr. Simpson said nurses very seldom know how to clean a tube, and that is true. In our hospital we make it a point that the nurses know how to take care of these tubes, and we make it hard for them to get through their examinations unless they can take care of a tracheotomy tube. It is a nurse's duty to take care of these tubes and to know what to do in emergency intubation. I believe if we emphasize this with nurses and take a little time to show them how to take care of these tubes we will get results and save a good many lives.

Dr. Foster (closing).—I feel amply repaid for presenting this paper by the discussion. I want everybody to understand that I do not condemn tracheotomy. I always carry my tracheotomy tubes with me, but very seldom have use for them.

In regard to laryngeal stenosis following diphtheria I think the argument that intubation is responsible for this is entirely wrong. Laryngeal stenosis has always been known to follow laryngeal diphtheria in a certain percentage of cases. It is a fact that intubation is done by a large ma-

jority of men now, but the fact that most of these cases have been intubated is no reason to assert that intubation is responsible. I think one of the keenest observers is Mr. Mueller, who has been observing these cases for a long time. He was in the instrument business in London at the time O'Dyer introduced intubation and he spoke of the slowness with which the English took up intubation. The thing that impressed him was the large number of cases that came in for tubes that were constant tube wearers after tracheotomy for laryngeal diphtheria. I think you will find the large number is due to the severity of the disease and not to the intubation. I grant that a properly done tracheotomy, done by a man who knows how, or a properly done intubation, will relieve a vast majority of cases. The fact that Dr. Lynch has had no bad results is due to his skill and the fact that he has done all these cases in a hospital. The average man going into the rural districts will not get the good results that Dr. Lynch gets in a hospital. I think our men doing this sort of thing to a certain extent feel their lack of training in doing either operation. A great many men in nose and throat work are not trained to do intubation or tracheotomy, and if they do either one they are excited and do not pay careful attention. To me an intubation is very easy. Some people do not think so. If one will keep the landmarks and not become excited, it is easy to introduce the tube.

In regard to long intubation tubes, of course we realize they can not be introduced without direct inspection.

In regard to intubating in rural districts, it has been my custom to intubate where I could stay some time with the case. If I have to go and see a case and go away immediately, I usually do a tracheotomy.

The point brought out by Dr. Marchman in regard to the proper size tube is important. We had an epidemic some years ago of laryngeal diphtheria when I did 25 intubations in six weeks, and at times, although I had two sets of tubes, I ran out of the proper size and had to use a tube too small. In one or two instances the tube was coughed up and had to be replaced. Fortunately, however, I was able to save the patient's life in each instance.

The administration of large doses of antitoxin is extremely important. I do not think they ought to have less than 30,000 units of antitoxin. I do not agree, however, that the intubation tube should be taken out so soon as some suggest. We know that the maximum effect of antitoxin is not derived for forty-eight hours, and I do not believe that the tube should be removed under that time. I usually leave it in three days or more.

Southern Medical Journal
JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Published monthly. Price $3.00 the year; 25 cents the single copy.
Address Southern Medical Journal, Empire Building, Birmingham, Alabama
Entered at the Birmingham, Ala., postoffice as second-class matter under Act of Congress, March 3, 1879

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Vol. XIV APRIL 1921 No. 4

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Fifteenth Annual Meeting, Hot Springs, Arkansas
November 14-17, 1921

PRACTICAL METHODS OF DEALING WITH THE MALARIA PROBLEM

That the Southern Medical Association is becoming the clearing house through which passes the reports of the most important medical activities of sixteen states is no better demonstrated than in the Conference of the National Malaria Committee which is in session the first day of its annual meetings. At these conferences the various phases of the South's greatest public health problem are discussed; and from the progress reported there can be no doubt that in a few years malaria will be a rare disease in the hundreds of thousands of square miles of fertile agricultural territory that have not been developed as they would have been had it not been for the fear of the "deadly miasm" (malaria) on the part of Northern and European settlers. These Conferences are attended, not only by the members of the National Committee on Malaria, but hundreds of public health officials and general practitioners, who hear the papers read and take part in the discussions on the many problems connected with malaria and its prevention.

The Conference on Malaria at the Louisville meeting was of unusual interest and importance. It was participated in by many who have had the largest experience in dealing with the clinical and public health phases of the disease. Several of the most important papers, with the equally valuable discussions on them, that were presented in the Conference on Malaria are published in this number of the JOURNAL. They probably represent the most practical, as well as the most valuable contributions of the year to the literature on malaria, and they merit careful study by those who have to deal with the clinical and public health phases of the prevailing disease of many rural districts of the South.

THE NEED FOR RELIABLE STATISTICS ON MALARIA

For years the South has been considered a hot bed of malaria, though until recently there have been no reliable statistics regarding the number of cases in any state of the Union. There can be no question that the prevalence of malaria in the South has been grossly exaggerated, both as to the number of cases and as to the seriousness of the disease; and it is desirable to secure reliable data regarding the morbidity and mortality rates in each county in every state in which the disease prevails. This is important not only to allay the fears of prospective immigrants to the agricultural districts of the South, but to furnish the data for intensive campaigns to eradicate malaria from its strongholds. In other words, the truth about malaria in the South is most desirable and this can come only from the intelligent co-operation of all the physicians in each county unit.

Dr. W. S. Leathers, in the Symposium on Malaria which is published in this number of the JOURNAL, calls attention to the difficulties in getting accurate reports on malaria and states that an error of 25

per cent may be expected, largely for the reason that in malarial districts many physicians are inclined to make the diagnosis of malaria in most acute febrile conditions of obscure origin, and some are prone to call many chronic conditions malaria in which it is not a factor in producing the symptoms.

Of course the ideal thing would be not to report any case as malaria until the plasmodium is found in the blood, and this practice can be carried out in hospitals equipped with good laboratories; but the general practitioner, who has to make his own blood examinations or who has to send specimens to the state laboratory, can not wait for positive findings before administering quinin in suspected malaria. He therefore must rely on the clinical symptoms for his diagnosis. In the acute cases, with chills and fever at regularly recurring intervals, the general practitioner is not often mistaken in his diagnosis, though in paludal districts pyelitis, tuberculosis and other diseases in which these febrile reactions are often called malaria for months before the real origin of the symptoms is discovered.

Malaria should be reported as are other communicable diseases and for the same reasons. Every physician should feel it a duty to report his cases of malaria. In so doing he is performing a real service for his people. Mississippi's record of 90 per cent of physicians reporting malaria is one which may well be emulated by the doctors of other states.

STANDARDIZING THE TREATMENT OF MALARIA

One of the reasons for the continued prevalence of malaria in any locality is the fact that infected patients have not been freed from the parasites before treatment was discontinued. Until recently there were many methods for administering quinin, most of which were effective only in relieving the acute symptoms, leaving the patients carriers of the infection. They therefore perpetuated the disease. Bass and others of the National Malaria Committee have worked out a plan of treatment that is known to completely eradicate the plasmodium from the blood of malaria patients. The article by Bass in this number of the JOURNAL gives the details of this simple but effective method for the radical cure of malaria. It has the approval of the National Malaria Committee and every physician who has to treat malaria would do well to adopt the Bass method.

It is not possible to give a complete editorial review of all the articles in the Symposium on Malaria, nor is it necessary. All of them should be carefully read by every physician in the South, whether specialist, general practitioner or public health worker, because malaria may modify the course of any other disease with which a human being may be afflicted. Besides physicians are members of the most altruistic profession and they are interested in eradicating this insidious enemy to mankind.

THE NURSING MOTHER'S DUTY TO HER CHILD

The average baby, helpless as it looks, has an endurance and power of adjustment which deserves better treatment than it usually receives. It tries its best to help us as we blunder along. If it had not, the human race would have vanished from the earth many thousands of years ago. If we chose fuel for our automobile, comparable to the grade of food which we put into babies, and as suited to the cars as the food is to the babies, we should soon put them in the shop to stay. We know how quickly we can clog a small car by putting too heavy oil into it, and what slight effect light oil has upon a powerful motor. The motor makes no effort to meet

us half way. It says, "Give me the balanced diet that I need, or I shall not work." Man constructed the motor, and can make food for it. We have never assembled a baby nor made any part of its anatomy. And until we have done that we can not make a food which will meet all its requirements as well as the milk which is manufactured by Nature for it. The greatest advance in pediatrics has been the admission of this and its inculcation into the minds of mothers.

In discussing a paper at the recent Louisville meeting of the Southern Medical Association, Dr. J. A. Hayne, State Health Officer of South Carolina, remarked:

> "The Bulgarian bacillus was the panacea for all evils about three or four years ago with the pediatrists. They used it for every conceivable disease. I knew of one case of club foot in my part of the country which was unsuccessfully treated by that method. I find that that has lapsed, and the clinic at the Massachusetts General Hospital says that the Bulgarian bacillus has little value in the treatment of children's diseases. . . . We see one fallacy after another . . . gradually discarded. There is one outstanding method of feeding infants which will never lose its popularity with the infant, and that is for the mother to nurse her own baby. If she can't do that she has no right to have a baby."

Dr. Hayne is a little too hard on the mothers. There are some women who can not nurse their babies, who nevertheless have the mother instinct and want babies, and who therefore should not be denied the right of having them. The majority of women want to nurse their babies. If they do not, it is because the importance of nursing has not been sufficiently impressed upon them by the medical profession. For the most part this lesson has been taught the public by the pediatrician and the general practitioner. We have taught the mother this, which we have observed: that the breast-fed baby generally thrives, even amid unfavorable conditions and some neglect; that the artificially-fed baby requires extreme care. The public as a whole is eager to believe what we tell it, and, without understanding the reasons, to take our word as Gospel.

We must teach mothers to conserve the milk supply by proper eating, regular exercise, and ample rest. Lactation depends to a certain extent upon temperament. The nervous woman is frequently less successful than her more placid friend. On the other hand, women with large breasts are frequently found to produce less milk than the flat-chested type.

The mother must be taught that lactation is to a certain extent psychological, that for a year she must give up a great deal of her activity for her child. There is a wide area within which she must choose her work for that time.

NURSING INTERVALS

There has been a good deal of discussion of the periods between nursings. Twenty years ago, the mother nursed her baby every time it cried. Many babies lived. Ten years ago they were nursed every two hours. They still survived. Now we have prolonged the period to three or four hours, and it is common for a three-month-old baby to sleep eight hours at night without waking. It has only to be trained.

There are still many opponents of the four-hour schedule. It has been demonstrated that the average baby gains as rapidly on a four-hour schedule as on a three. The physicians who first advocated the change from a two-hour schedule to a three were considered cruel and mistaken. We finally admitted, first, that three hours was a good schedule, and we are now admitting four. The opponents of the four-hour plan are now saying that it is safe for the baby, but that with such infrequent emptying of the mammary glands the mother's milk dries up. But clinical observation would seem to refute it. We may point to the cow for our example. She does very well on two milkings per day. It is not so much the frequency of the milkings, as their regularity, which makes for a good milk supply.

The milk supply may be affected indirectly by the four-hour schedule. The mother on the four-hour plan has more time to herself, longer intervals to be away from the baby, and tries to do more than the one who must be interrupted and come home for three-hour feedings. The woman who hurries through her nursing to go out to keep an engagement and rushes back at the last minute to nurse her baby, will lose her milk. She should not try to keep up with many engagements, not engage too actively in other affairs while lactating. Like the cow, between milkings she should forage and ruminate, but run no races.

INFLUENCE OF STRAIN

Dr. Frances Sage Bradley, Chief of the Children's Bureau, U. S. Department of Labor, Washington, said in closing the discussion of her paper at the Louisville meeting of the Southern Medical Association:

"I have attended many medical meetings and listened to learned, scientific papers on artificial feeding, and heard many men make the statement that the modern woman would not nurse her baby out of consideration for her figure or on account of the pressure of social duties. Yet in my own practice it was rare to find a woman refusing to nurse her baby, while it was a daily occurrence to find women grieving and struggling against their disappearing milk. I feel now that had I done my duty by these women I should have obviated the catastrophe of bottle feeding by finding what in their lives prevented the calm, serene regimen necessary to prolong lactation. You will find the breast-fed baby in the country and the bottle-fed baby in the city where women are subjected to more of nervous tension and strain. I feel very strongly that the physician with his superior knowledge and training is more responsible than the mother for this much-mooted question which is costing the lives of thousands of babies every year."

PRESIDENT HARDING'S PHYSICIAN

President Harding has appointed his family physician, Dr. C. E. Sawyer, of Marion, Ohio, a Brigadier-General in the Regular Army, and has assigned him to duty as the Medical Aide to the White House. In making this appointment President Harding is following the precedent of President McKinley, who promoted Lieutenant-Colonel Leonard Wood, of the Medical Corps of the United States Army, to the rank of a Brigadier-General. President McKinley, in discussing this appointment with one of his friends, said: "Dr. Wood has done so much for Mrs. McKinley that I am making him a Brigadier-General." The fact that General Wood was a "Rough Rider" is responsible for the general opinion that Roosevelt made him a Brigadier-General, but he was given that rank before President McKinley's death.

President Wilson, when he entered the White House, appointed as his physician Dr. Cary T. Grayson, of the U. S. Navy Medical Corps. Dr. Grayson was first an appointee of President Roosevelt, and was President Taft's physician during his administration. After years of service as the White House physician President Wilson appointed him a Rear-Admiral in the Navy.

It is customary for Presidents to assign an officer in the Army or Navy as White House physician, and President Harding seems to be breaking all precedents by taking a physician from civil life and giving him high rank in the Army to act in the capacity of his medical advisor. President Harding's probable reason for bringing his physician from his home town to the White House is that he is an ardent believer in homeopathy, his father and brother having practiced that form of medicine; and there are probably no homeopaths in the regular Army or Navy.

President Harding has been harshly criticised for bringing his personal physician to the White House at the expense of the Government, and for giving a civil-

ian high rank in the regular Army; but we think that the President of the United States should have the privilege of selecting his physician from civil life, and certainly the rank and pay of a Brigadier-General is not more than the President's physician deserves. If the President prefers a homeopath to a regular physician he should be allowed to exercise the privilege of selecting the man in whom he has most confidence as his medical adviser.

It is also stated that Dr. Sawyer will be President Harding's adviser regarding the health activities of the Government. A recent dispatch from Washington says that he "will take charge of a general reorganization of welfare bureaus in the Government, including the U. S. Public Health Service, the Children's Bureau, and kindred organizations."

GRAYSON ASSIGNED AS CHIEF OF NAVAL DISPENSARY

Rear-Admiral Grayson, who retires as the White House Physician, having served three Presidents—Roosevelt, Taft and Wilson—probably has the longest record of service as presidential medical adviser of any physician who has occupied that position. Certainly no White House physician has ever had more varied experience with Presidents; and a doctor who has had and has retained the confidence of three such varied types of men as Roosevelt, Taft and Wilson must be a man of tact and judgment, as well as a physician of unusual attainments.

Admiral Grayson has been more than a physician to President Wilson; he has been his closest friend throughout the eight years of an eventful period of history. Having been assigned to the duty of Chief of the Naval Dispensary in Washington, he can continue to look after his distinguished patient.

THE MEDICAL INTERPRETER*

A recent notable and worthy enterprise is the *Medical Interpreter*, published in four quarterly volumes. It proposes to publish in permanent form a digest of the worth-while current medical literature of the world, particularly that culled from the foreign medical books and journals. The publishers of the *Medical Interpreter* are making the effort to place in the hands of the medical profession abstracts, summaries or translations of the important articles on the recent advances in all branches of medicine and surgery that have been gathered in the greatest medical library in the world, i. e., the Library of the Surgeon-General of the United States Army.

They have selected a staff in Washington which has access to this great library and which is eminently fitted to make a digest of the things that will appeal to medical men in all lines of work. Dr. Albert Allemann, Principal Assistant Librarian of the Surgeon-General's Library, is Editor-in-Chief; Capt. J. S. Taylor, in charge of the Division of Medical Publications of the U. S. Navy, and Assistant Surgeon-General J. W. Schereschewsky, of the U. S. Public Health Service, are Associate Editors.

The *Medical Interpreter* will appeal to Southern physicians not only because of exceptional merit, but because it is largely Southern brains and Southern enterprise that have produced this practical and distinctive contribution to American medical literature. The publishers have secured a staff of eminent Southern physicians to collaborate with the Washington editors with the idea of selecting and editing the articles that may be of particular interest to the physicians residing in the region known as the South.

**The Medical Interpreter*, Interpreter Publishing Co., Austell Building, Atlanta, Ga.

Drs. George M. Niles, W. F. Shallenberger, W. L. Barnes and Allen H. Bunce, of Atlanta, and Drs. George S. Bel and Oscar Dowling, of New Orleans, all of whom are prominent in medical circles, are collaborating editors.

The publishers recognize the part that organized medicine is playing in the advancement of medicine by dedicating issue No. 2 of the *Medical Interpreter* series to the American Medical Association and the Southern Medical Association "as a tribute to their high professional ideals and constructive labors in behalf of the medical profession." The JOURNAL, on behalf of the Southern Medical Association, desires to express its appreciation of this compliment from the publishers of the *Medical Interpreter.*

Correspondence

DROP OR PTOTIC HEART

BUCKLIN, MO., January 15, 1921.

Editor, SOUTHERN MEDICAL JOURNAL:

In the December, 1920, number of the JOURNAL appears an article by Dr. H. R. Carter, Jr., of Birmingham, entitled "The Practical Importance of the Effort Syndrome in Civil Practice."

This I have read with great interest, because it fulfills the prophecy made by Dr. Charles Lyman Greene in his estimable work on "Medical Diagnosis" that this particular group of symptoms would be paramount, during the war, in soldier individuals whom he characterizes as chronic congenital asthenics possessing the "drop heart" which he has laid so much stress upon, but which even yet does not seem to be generally recognized. I wish to call the attention of the readers of the JOURNAL to Greene's description of this condition in the hope that it may be catalogued under its proper division and receive the attention that it deserves.

To those who have read Greene's description and have used the radiograph to verify those observations there can be no question of its reality.

I do not question the belief that the type of heart described by Carter is merely the drop heart of Greene.

He (Carter) says, and stresses the fact, that these hearts showed no enlargement, which I presume means that they fell within the normal limits of measurement for hearts of the normal individual of corresponding height and build.

This has been the undoing of this type of heart in the past, for the drop heart may be widely dilated and still fall within the limits of the normal heart for normal individuals.

I want to bring out this subject, not to criticise Dr. Carter, but merely as an attempt to clear up the nomenclature of this condition. Drop or ptotic heart seems to me to be a better classification than effort syndrome, and it has a priority.

Very truly yours,

J. DE'VOINE GUYOT.

Book Reviews

Diagnosis and Treatment of Brain Injuries, with and without a fracture of the skull. By William Sharpe, M.D., Professor of Neurologic Surgery, New York Polytechnic Medical School and Hospital; Consulting Neurologic Surgeon, Manhattan Eye and Ear Hospital for Ruptured and Crippled, Beth Israel Hospital, New York City, and Nassau Hospital, Mineola, Long Island, etc. 757 pages, 232 illustrations. Philadelphia and London: J. B. Lippincott Co., 1920.

The information given in this book is valuable and the illustrations are splendid. It is unfortunate that the diction is most difficult. The author does not understand the first elements of sentence structure.

Brain injuries in adults, in children and new-born infants are described in a way that should be interesting to the general practitioner, general surgeon, obstetrician and pediatrician. The suggestions regarding injuries, frequently unnoticed, to the brains of infants taken with forceps are particularly good. Many cases are given with good and bad results, and forceful discussions. Cases formerly considered hopeless are successfully treated by the methods here outlined. The book is a worthy addition to the literature of brain surgery.

Practical Tuberculosis. A Book for the General Practitioner and Those Interested in Tuberculosis. By Herbert F. Gammons, M.D., Supt. Woodlawn Sanatorium, Dallas, Texas; Assistant Instructor, Clinical Medicine, Baylor Medical College, Dallas, Texas; Formerly Resident Physician, Cullis Consumptives' Home, Dorchester, Mass.; Assistant Physician, Massachusetts State Sanatorium, Rutland, Mass.; Assistant Supt., Conn. State Sanatorium, Meriden, Conn.; First Assistant Physician, Texas State Tuberculosis Sanatorium, Carlsbad, Texas; and Supt. Deerwood Sanatorium, Deerwood, Minn. Introduction by J. B. McKnight, M.D. 158 pages. St. Louis: C. V. Mosby Co., 1921.

This is a convenient handbook for the general practitioner and for the patient as well. It deals only with pulmonary tuberculosis. Any consumptive would be benefited by following the rules of living told here simply and briefly. The chapters on treatment are condensed, but rather complete. Dr. Gammons says: "It is the tendency of the physician on hearing of a certain treatment for tuberculosis to use that treatment on all cases regardless of consequences, not stopping to think that nature has cured hundreds of cases with natural processes." He is opposed to early use of pneumothorax, but believes in its value in emergencies.

Diseases of the Ear. By Philip D. Kerrison, M.D., F.A.C.S., Aural Surgeon, Willard Parker Hospital for Infectious Diseases; Junior Aural Surgeon, Manhattan Eye and Ear Hospital. 332 illustrations in text and two full pages in color. Second Edition. Revised and Enlarged. Philadelphia and London: J. B. Lippincott Co.

The second edition is quite up to the standard set by the former edition, and while nothing new is presented, the practical developments in otology and correlated pathologic conditions affecting the meninges, the cerebral sinuses, and the cerebro-spinal fluid have been closely followed without material alterations in the text and subject matter of the former edition. However, two new chapters have been added, of which the first is devoted to Barany's theory of the cerebellar control of joint movements, with a discussion of the pointing tests in their relation to vestibular and cerebellar disease. The second includes a brief account of the various types of war deafness, deafness due to direct injury of the skull, nerve deafness due to loud explosive noises, concussion deafness due to the air displacements of near-by explosions, psychic disturbances of function, pithiatism, etc., phenomena which constitute for most of us a practically new chapter in aural disease. The book is a useful addition to otologic literature.

Pediatrics and Orthopedic Surgery. From the Practical Medicine Series Comprising Eight Volumes on the Year's Progress in Medicine and Surgery. Under General Editorial Charge of Charles L. Mix, A.M., M.D., Professor of Physical Diagnosis, Northwestern University Medical School. Vol. iv, Pediatrics, Edited by Isaac A. Abt, M.D., and A. Levinson, M.D.; and Orthopedic Surgery, Edited by Edwin W. Ryerson, M.D., and R. O. Ritter, M.D. Chicago: The Year Book Publishers, 1920.

This series may be bought in whole or in part. The volumes are useful in bringing up to date the information to the general practitioner on all medical subjects. They are necessarily brief, but useful.

Regional Anesthesia (Victor Pauchet's Technique). By B. Sherwood-Dunn, M.D., Officier d'Academie; Surgeon (Colonel) Service de Sante Militaire de Paris; Physician to the Cochin Hospital. With 224 figures in the text, 293 pages. Philadelphia: F. A. Davis Co. English Depot, London: Stanley Phillips, 1920.

This book constitutes a resume of the writings of Victor Pauchet, the leading exponent in France of regional anesthesia. Local anesthesia has long been known and used. It consists in infiltrating the tissues to be operated upon by injecting the anesthetic near the terminals of the nerve. In regional anesthesia, the origin of the nerve is injected, so that the whole region supplied by the nerve and its branches is anesthetized. Major operations may then be performed as well as minor, with frequent diminution of risk to the patient. The writer advocates the use of regional anesthesia in 80% of all operations.

Methods of anesthetizing and operating upon all parts of the body are described. There are a variety of operations described by Pauchet, among which are a large tumor of the lower maxillary, which had been diagnosed inoperable sarcoma; also leg amputations, operations upon the brain, and many others. Many accidents due to general narcosis are, he says, avoided.

It is interesting as a record of splendid work in a greatly neglected field, and will be valuable to all who practice surgery.

Scurvy: Past and Present. By Alfred F. Hess, M.D., Clinical Professor of Pediatrics, University and Bellevue Hospital Medical College, New York City. 278 pages, illustrated. Philadelphia and London: J. B. Lippincott Co., 1920.

Dr. Hess is most competent to write on this subject, since he has been doing intensive research in it for some years, and has published many articles upon it during that time. The subject is of importance on account of the nutritional troubles in the recent war, and on account of the multitudes of people still starving in Europe. He discusses the history of scurvy, the antiscorbutic value of different foodstuffs, mentioning dried milk as having considerable value, the theories concerning scurvy, its symptomatology, and treatment. He is up to date and his little book most opportune.

A Text Book of Histology. By Frederick R. Bailey, A.M., M.D. Sixth revised edition; profusely illustrated; 733 pages. New York: William Wood & Co., 1920.

The sixth edition is in general plan the same as the first. The text has been revised and partly rewritten. The chapter on the nervous system, which was full in the first edition, has been greatly enlarged and rewritten chiefly by Dr. Strong, of Columbia University, and now occupies almost one-third of the book. In view of the increasing interest in psychology, this chapter should be widely read. More works of this kind might turn the modern trend of psychiatry from spiritualism to a more material outlook.

The chapters on the cell and the opening chapters on general technic and staining methods are valuable. The book has always been highly esteemed. This edition will add to its popularity.

The Story of the American Red Cross in Italy. By Charles M. Bakewell. 253 pages, illustrated. New York: The Macmillan Co., 1920.

The work of our Red Cross in Italy has been, as an Italian said, "Not merely a work of compassion, but also a work of large constructive statesmanship."

In this book the story of the Red Cross is told from a literary and human rather than a statistical standpoint. It is valuable for its description of Italy at the beginning of the war and during it, and for pictures of characters now historical. D'Annunzia was "a small insignificant looking man with a thin voice." Others are briefly sketched. The photographs of persons and scenes are one of its charms. It gives a vivid picture of the conditions due to the war, and deserves a place among historical writings.

The Lone Scout, A Tale of the United States Public Health Service. By Edward Champe Carter, with a Foreword by William C. Gorgas, Surgeon-General, U. S. A. (retired). 240 pages. Boston: The Cornhill Co., 1920.

Dr. Gorgas tells us that Dr. Carter originated the idea of using Boy Scouts in the control of malaria. Dr. Carter relates an interesting story, which would undoubtedly have a strong appeal to boys of the Scout age. It is full of useful information from how to make a chicken pie and many other delicacies to accurate methods of distinguishing various members of the Anopheles family; and this is woven into the plot in such a manner that the boys will absorb it subconsciously.

As a story it is slightly confusing if strictly analyzed, owing to the fact that too many characters are introduced for the length of the story. However, as regards its appeal to boys, it should rival the Henty and Alger books which youngsters so often devour. Its ideals and its purpose are most praiseworthy.

Optimistic Medicine, or the Early Treatment of Simple Problems Rather than the Late Treatment of Serious Problems. By a Former Insurance Man. 318 pages. Philadelphia: F. A. Davis Co., 1921.

We wonder why the author of the book concealed his identity. He has nothing to be ashamed of, so far as we can see.

The book is essentially popular rather than technical or scholarly. It contains generalities regarding proper living, proper and improper eating, means by which the physician may impress the laws of hygiene upon boys and girls and men and women, how to teach adolescents the need of caring for the teeth and various parts of the body, and the truth that beauty is health. It will no doubt be well worth the while of physicians and the laity as well.

The Eye, the Ear, and the Nose and Throat. The Eye. By Casey A. Wood, C.M., M.D., D.C.L., Colonel, M.R.C., U. S. Army; Emeritus Professor of Ophthalmology, College of Medicine, University of Illinois; Consulting Ophthalmologist, Cook County Hospital; Consulting Ophthalmic Surgeon, St. Luke's Hospital, Chicago. **The Ear.** By Albert H. Andrews, M.D., Professor of Otology, Rhinology and Laryngology, Chicago Polyclinic; Oculist and Aurist, Chicago, Rock Island and Pacific Railway, etc. **The Nose and Throat.** By George E. Shambaugh, M.D., Professor of Otology, Rhinology and Laryngology, Rush Medical College; Otologist of the Presbyterian Hospital. Chicago: Year Book Publishers.

This little volume, published primarily for the general practitioner, is one of a series of eight, covering the entire field of medicine and surgery, each volume being complete on the subject of which it treats. It is really surprising how completely and thoroughly the ground has been covered in this tabloid review, and the eye, ear, nose and throat specialist as well as the general practitioner will find it a valuable occupant of the handbag or pocket.

Hygiene of Communicable Diseases. A Handbook for Sanitarians, Medical Officers of the Army and Navy and General Practitioners. By Francis M. Munson, M.D., Lieutenant, Medical Corps, U.S.N. (retired); Lecturer on Hygiene and Instructor in Miltary Surgery, School of Medicine, Georgetown University; Formerly Instructor in Medical Zoology, Georgetown College; Late Brigade Surgeon, and Provisional Brigade, U. S. Marines. 793 pages, illustrated. New York: Paul B. Hoeber, 1920.

The book discusses the causes of communicable diseases, theories of immunity, theories of prevention, methods of disinfection, hospital, military, naval, railway, rural and municipal sanitation. The chapter on sanitary measures following great disasters is unusual and interesting. In the latter fourth of the book, specific diseases are classified and treated according to the method of communication: those spread by oral and nasal discharge, the fecal borne, venereal, insect borne, and methods of guarding against them are described. The book is useful to the public health worker, the physician and the sanitary engineer.

Normal Histology, with Special Reference to the Structure of the Human Body. By George A. Piersol, M.D., Sc.D., Professor of Anatomy in the University of Pennsylvania. 438 illustrations, 88 of which are in colors. 418 pages. Twelfth edition. Philadelphia and London: J. B. Lippincott Co., 1920.

Assuming that the student does not know or has forgotten the gross appearance of the organs whose tissues are to be studied, the author includes a description of each organ as it is taken up. The field of histology is covered from an interesting and unprejudiced viewpoint. The appendix contains a description of fixation and preservation of tissues, mounting and staining methods, etc. The book is thoroughly scientific and is useful for beginning medical students.

The Blind. Their Condition and the Work Being Done for Them in the United States. By Harry Best, Ph.D., Author of "The Deaf: Their Position in Society and the Provision for Their Education in the United States." New York: The Macmillan Company.

This book is a valuable contribution to sociologic as well as to scientific organizations. The author has undertaken to present a thorough and accurate survey of the condition of the blind in America and of the work being done for them. The book is divided into seven parts each subdivided into appropriate chapters dealing under appropriate headings with general conditions, prevention of blindness, education of the blind children, intellectual provision for the adult blind, material provision for the blind and a review of all organizations interested in the welfare of the blind.

A General Introduction to Psychoanalysis. By Prof. Sigmund Freud, LL.D. Authorized translation, with a preface by G. Stanley Hall, President, Clark University. 406 pages. New York: Boni & Liveright, 1920.

Freud is one of the most original, if not the most original, of modern psychologists. He is a disciple of the great Wundt, who founded the first laboratory in the world for experimental psychology. In his teachings he has gone beyond his teacher, and he builds his psychology chiefly on the topics which Wundt neglects: the unconscious, the abnormal, sex, and affectivity generally. Although he in his turn has pupils who have gone beyond him, he holds his place as one of the greatest contributors to science.

His interpretation of dreams and involuntary or unconscious words and acts in terms of subconscious repressed sex impulses has been given widest attention by students of literature and science. We feel, as do some of his followers, that this side of his theory is exaggerated. Though no doubt sex instincts play a far larger role in our conduct than we admit, the reviewer believes they do not, as he would have us believe, dominate every other impulse.

It is to be regretted that Freud separates the field of psychology from that of physiology.

This volume shows the learned scientist as a popularizer, writing to portray his philosophy to the average layman. It will no doubt be widely read.

Southern Medical News

ALABAMA

Plans for the construction of the first unit of the Alabama Home for the Feeble-minded, Tuscaloosa, have been completed. The approximate cost of the building will be $175,000.

Dr. George C. Marlette, Bay Minette, has been appointed Full-time Health Officer for Baldwin County.

At a conference between Dr. S. W. Welch, State Health Officer, Montgomery, and officials of the International Health Board, recently held in Baltimore, the Board appropriated $25,000 for 1921 for the organization of additional county health units and further extension of malaria control work in Alabama.

A Children's Clinic has been established in Madison County. Funds for this Clinic were secured through the sale of Christmas Red Cross seals.

The addition to St. Margaret's Hospital, Montgomery, has been completed and opened for the reception of patients. It is a four-story building and will accommodate forty-one patients.

Dr. Clarence Kelley Gilder, Corona, and Miss Clyda Brotherton, Birmingham, were married December 22.

Deaths

Dr. Francis L. Sanderson, Ramer, aged 47, died February 11.

Dr. Franklin Pearce Landers, Gadsden, aged 64, died February 23 following an operation for appendicitis.

Dr. Andrew Maury Woodson, Birmingham, aged 46, died February 13 from pneumonia.

ARKANSAS

The City Clinic, Little Rock, has been discontinued. Patients will in future be referred to the Isaac Folsom Clinic.

An appropriation of $60,000 has been made by Congress for the completion of the Government free bath house at Hot Springs Reservation.

A free clinic for women and children has been opened in Fort Smith in the Community Building. The clinic has the co-operation of the Sebastian County Medical Society.

Dr. Robert B. Corney, Physician at the State Penitentiary at Cummins, has resigned.

Dr. Harry Herr Smiley and Mrs. Jodie Williams Reed, both of Texarkana, were married February 19.

Dr. Marion Nicholas York and Miss Essie Octavia Tillery, both of Little Rock, were married February 12.

Dr. DaCosta Walker and Miss Toka Ann Stewart, both of Hot Springs, were married February 6.

Deaths

Dr. Hamer S. Beasley, Pearson, aged 51, died January 27.

Dr. Cornelius B. Dunn, Camden, aged 73, died February 7.

Dr. Will T. Atkins, Bates, aged 53, died the latter part of December from carcinoma of the tongue.

DISTRICT OF COLUMBIA

The dates of the International Congress of Ophthalmology, to be held under the auspices of the American Ophthalmological Society, the American Academy of Ophthalmology and Oto-Laryngology and Fellows of the Section on Ophthalmology of the American Medical Association, at Washington, have been changed from April 18-21, 1922, to April 25-28, 1922.

Dr. Hugh S. Cumming, Surgeon-General, Public Health Service, Washington, on February 28 called a meeting of the state and Federal officers from several of the large Atlantic ports and discussed the occurrence of typhus cases among immigrants from Europe.

Dr. Charles W. Richardson, Washington, recently received the honorary degree of Doctor of Science from the George Washington University.

Admiral Cary T. Grayson, Washington, has been ordered to duty as Officer in Charge of the Naval Dispensary at Washington.

Deaths

Dr. Louis C. Purman, Washington, died January 26.

FLORIDA

A large sanitarium, to cost $20,000,000, is to be erected on 4,000 acres of ground near Jacksonville by a syndicate.

Dr. J. H. Hodges, Gainesville, has succeeded Dr. Loren A. Greene as Superintendent of the Florida Farm Colony for Epileptic and Feeble-minded at Gainesville.

Dr. Henry O. Snow has succeeded Dr. Roscoe E. Glass as Physician of Hillsborough County.

The State Board of Health and Dr. G. R. Holden, Jacksonville, have arranged a clinic where certain classes of cancer patients will receive free radium treatment.

Dr. Benjamin F. Hodsdon, Miami, has resigned as a member of the City Board of Health.

Dr. J. G. Lester, Bartow, has been appointed Physician of Polk County.

The State Board of Health will establish a laboratory at Orlando to serve the needs of Central Florida. Quarters and all facilities, except laboratory equipment, will be provided by Orange and Seminole Counties and the Orlando Chamber of Commerce.

Deaths

Dr. Benjamin Claude Dodds, Sanford, aged 39, died February 15, following an operation for appendicitis.

GEORGIA

The State Board of Health Laboratory Directors of the Southern states held a conference in Atlanta March 18-19. Laboratory problems peculiar to Southern state boards of health were discussed.

Dr. James A. Thrash, Columbus, has been appointed City Health Officer to succeed Dr. B. J. Fitzmorris.

The Wesley Memorial Hospital and Candler Memorial Hospital for Women and Children is being constructed at Atlanta. A fund of $1,000,000 was given by the children of Asa G. Candler as a memorial to their mother to be used in the construction of the building. The Emory University School of Medicine will use the facilities of the hospital in training its students. A campaign for special equipment is being conducted by Methodists of Georgia and neighboring states.

The Talbot County Medical Association was recently organized. The following officers were elected: Dr. J. B. Douglas, Talbotton, President; Dr. J. E. Peeler, Woodland, Vice-President; Dr. C. C. Carson, Talbotton, Secretary-Treasurer.

Dr. T. D. Longino, Atlanta, has been elected Vice-President of the Board of Trustees of Grady Hospital.

The Lamar County Medical Association was recently organized. The following officers were elected: Dr. John M. F. Barron, Milner, President; Dr. Clarence H. Willis, Barnesville, Vice-President; Dr. John M. Anderson, Barnesville, Secretary-Treasurer.

Dr. James H. Doughty, Jr., Augusta, has been re-elected President of the State Board of Health.

An active campaign for funds for the erection of a memorial to Dr. Robert Battey is being conducted by committees of Rome physicians and members of the Women's Auxiliary of the Floyd County Medical Society. It is hoped that the memorial will be unveiled May 4 in connection with the meeting of the Georgia State Medical Association.

Dr. James H. McDuffie, Columbus, has been re-elected Vice-President of the State Board of Health.

Deaths

Dr. Samuel P. Ousley, Macon, died January 20 from cerebral hemorrhage.

Dr. James Fulton Wilson, Waycross, aged 73, died January 17 from cerebral hemorrhage.

Dr. Robert H. Mobley, Uvalda, aged 39, died January 18 from heart disease.

Dr. Robert I. Battle, Cartersville, aged 78, died January 23.

Dr. William O. Trammell, Atlanta, aged 63, died January 30.

KENTUCKY

Dr. Jethra Hancock, Louisville, has been appointed Director of the Bureau of Venereal Diseases of the State Board of Health to succeed Dr. Milton Board, who has accepted a position in Washington in the psychiatric work of the United States Public Health Service.

A sum of $5,000 has been appropriated by Scott County, which is to be supplemented by $2,500 each from the State and the Rockefeller Foundation, for the maintenance of a full-time health department. Twenty-five hundred dollars was also appropriated for current expenses of the John Graves Ford Memorial Hospital.

The following officers have been elected for Carlisle County Medical Society: Dr. R. C. Barrow, President; Dr. J. F. Dunn, Vice-President; Dr. G. W. Payne, Secretary-Treasurer.

The following are officers for McCreary County Medical Society: Dr. A. A. Weddle, President; Dr. W. R. Cundiff, Vice-President; Dr. R. M. Smith, Secretary-Treasurer.

New officers for Daviess County Medical Society are as follows: Dr. C. M. Rice, Sutherland, President; Dr. W. H. Strother, Owensboro, Vice-President; Dr. J. J. Rodman, Secretary-Treasurer.

The following officers have been elected for Fleming County Medical Society: Dr. E. T. Runyan, President; Dr. W. T. Jessee, Vice-President; Dr. C. W. Aitkin, Secretary-Treasurer.

New officers for Henderson County Medical Society are: Dr. J. U. Ridley, President; Dr. C. R. Tanner, Vice-President; Dr. Peyton Ligon, Secretary-Treasurer.

The following have been elected officers for Christian County Medical Society: Dr. F. P. Thomas, Hopkinsville, President; Dr. W. S. Sandbach, Pembroke, Vice-President; Dr. E. McD. Trabue, Pembroke, Secretary-Treasurer.

The following are officers for Marshall County Medical Society: Dr. S. L. Henson, President; Dr. L. E. Stinson, Vice-President; Dr. E. D. Covington, Secretary-Treasurer.

At a recent meeting of the Harrison County Medical Society the following officers were elected: Dr. Josephus Martin, President; Dr. C. L. Swinford, Vice-President; Dr. W. B. Moore, Secretary; Dr. B. B. Petty, Treasurer.

Dr. E. C. Roemele has been appointed Physician of the Frankfort Reformatory to succeed Dr. Lindsay H. Morrison.

The Fulton Academy of Medicine has been organized at Fulton. Dr. John M. Alexander was elected President, and Dr. Henry T. Alexander, Secretary.

The annual meeting of the Louisville Eye and Ear Society was held on January 13, at which time the following officers were elected: Dr. Walter Dean, President; Dr. J. R. Peabody, Vice-President; Dr. Gaylord C. Hall, Secretary-Treasurer.

The following officers have been elected for Crittenden County Medical Society: Dr. T. A. Frazer, President; Dr. W. C. Davis, Vice-President; Dr. C. G. Moreland, Secretary-Treasurer.

The Wayne County Medical Society has elected the following officers: Dr. O. M. Carter, President; Dr. C. B. Rankin, Vice-President; Dr. J. F. Young, Secretary; Dr. T. H. Gamblin, Treasurer.

The following are officers for McCracken County Medical Society: Dr. L. P. Molloy, President; Dr. O. R. Kidd, Vice-President; Dr. Vernon Blythe, Secretary.

The following are new officers for Hickman County Medical Society: Dr. E. B. McMorries, President; Dr. E. D. McCarty, Vice-President; Dr. W. F. Peebles, Secretary-Treasurer.

Officers for Russell County Medical Society are: Dr. J. B. Tartar, Russell Springs, President; Dr. W. G. D. Flanagan, Jamestown, Vice-President; Dr. J. B. Scholl, Jabez, Secretary-Treasurer.

The following are new officers for Montgomery County Medical Society: Dr. O. P. Henry, President; Dr. C. K. McKenna, Vice-President; Dr. J. F. Knox, Secretary-Treasurer.

The Oldham County Medical Society, at a recent meeting, elected Dr. H. B. Blaydes, President, and Dr. S. J. Smock, Secretary.

Dr. C. B. Kobert, Lebanon, has been appointed to head the State Board of Health's Bureau for the Prevention of Blindness and Trachoma.

Dr. James M. Hubbard, Hickman, has been appointed Health Officer of Fulton County, and Dr. John M. Alexander, Fulton, Assistant Health Officer.

Fulton County plans to spend $12,000 during the year for work of the health department. Two full-time health officers will be substituted for its former part-time officer, a sanitary inspector and four public health nurses will be employed.

Dr. Z. M. Abshire has removed from Hazard to Buckhorn and will be associated with Drs. Gross and Collins.

Deaths

Dr. Alexander Henry Falconer, Louisville, aged 46, died February 19 from heart disease.

Dr. C. L. Venable, Franklin, aged 53, died February 21 from pneumonia.

Dr. James R. Cottell, Louisville, aged 30, died February 23 from nephritis.

LOUISIANA

During the year malaria surveys will be made of the districts around Lake Charles, Franklin and Holly Ridge. The towns to be benefited by the survey will be asked to bear 50 per cent of the expense and the Rockefeller Foundation will contribute the other half.

Dr. Roy B. Harrison, New Orleans, was recently elected Secretary-Treasurer of the State Board of Medical Examiners.

At the recent meeting of the Fifth District Medical Society the following officers were elected: Dr. F. C. Bennett, Monroe, President; Dr. A. E. Fisher, Choudrant, First Vice-President; Dr. J. M. Funderburk, Winnsboro, Second Vice-President; Dr. C. H. Mosely, Monroe, Secretary-Treasurer. The next meeting will be held at Ruston June 14.

Dr. A. Leigh, Lecompte, has removed to Zenoria.

Dr. E. A. Patton has removed from Midway to Hearne, Tex.

Deaths

Dr. Johnson Franklin McKneely, Clinton, aged 30, died January 26.

Dr. John Philip Berge, New Orleans, aged 60, died February 7.

Dr. Mark Russell McAlpin, Leesville, aged 64, died January 31 from heart disease.

MARYLAND

At the annual meeting of the Officers and Councilors of the American College of Physicians, held at Baltimore February 25, the following officers were elected: Dr. James M. Anders, Philadelphia, Pa., President; Dr. Frederick Tice, Chicago, Ill., First Vice-President; Dr. C. C. Bass, New Orleans, La., Second Vice-President; Dr. Frank Smithies, Chicago, Ill., Secretary-General; Dr. Clement R. Jones, Pittsburgh, Pa., Treasurer.

At the annual meeting of the American Congress on Internal Medicine, held in Baltimore February 21-26, the following officers were elected: Dr. Sydney R. Miller, Baltimore, President; Dr. Ellsworth S. Smith, St. Louis, Mo., First Vice-President; Dr. James Rae Arneill, Denever, Colo., Second Vice-President; Dr. Frank Smithies, Chicago, Ill., Secretary-General; Dr. Clement R. Jones, Pittsburgh, Pa., Treasurer.

Plans are being made by the U. S. Public Health Service to enlarge the quarantine station at Baltimore.

Alumnae of the Johns Hopkins Hospital School of Nursing have started a campaign to raise an endowment fund of $1,000,000. Miss Adelaide Nutting, Head of the Department of Nursing at Columbia University, is Chairman of the Executive Committee. Miss Elizabeth Fox, Director of Public Health Nursing for the American Red Cross in Washington, will organize Regional Committees throughout the United States.

Dr. Carlisle S. Lentz, who resigned as Assistant Superintendent of the Johns Hopkins Hospital, is now Superintendent of the University Hospital, Augusta, Ga.

It was announced at the Founders' Day celebration of the Johns Hopkins Hospital, Baltimore, February 22, that the trustees of the University would supplement the fund of $215,000 raised by the Alumni Association for a memorial dormitory building at Homewood. Dr. James Schouler's will provides for a gift of $14,500, and this added to a previous gift brings the benefaction to $25,000, which will be added to the endowment fund. The will of William Bennet Paca provides that the bulk of his estate, valued at about $100,000, be given to the Johns Hopkins University.

(Continued on page 38)

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(Continued from page 346)

Deaths

Dr. John I. R. Krozer, Baltimore, aged 93, died February 22 from pneumonia.

Dr. John A. Robb, Catonsville, aged 61, died January 30 from pneumonia.

MISSISSIPPI

The St. John's Clinic, Bay St. Louis, non-sectarian, was formally opened January 31. The clinic is under management of physicians of Bay St. Louis and their services will be rendered without charge to the indigent sick.

Deaths

Dr. Paul Green Pope, Grenada, aged 32, died February 21.

Dr. Peter Fairly, Jackson, aged 81, died February 6 from heart disease.

MISSOURI

The third annual meeting of the Western Electrotherapeutic Association will be held in Kansas City April 21-22. A three days' session of the Western School of Electrotherapy will precede this meeting, beginning April 18. Dr. Charles Wood Fassett, Kansas City, is Secretary.

A banquet in honor of the eightieth birthday of Dr. Andrew W. McAlester, Columbia, former Dean of the School of Medicine of the University of Missouri, was given by the Boone County Medical Association on February 15.

The annual convention of the National League of Nursing Education and the National Organization of Public Health Nursing will be held in Kansas City April 11-15.

Dr. B. A. Wilkes, St. Louis, has been elected Superintendent of the Missouri Baptist Sanatorium in St. Louis to succeed Mr. J. S. Whaton, deceased.

Dr. Emmett P. North, St. Louis, has been elected President of the State Board of Health.

Dr. Eli K. Marshall, Professor of Pharmacology of Washington University, St. Louis, was recently elected Professor of Physiology of Johns Hopkins Medical School, Baltimore.

The Federal Government has taken charge of Wesley Hospital, Kansas City, and will be used as a hospital for the care and treatment of wounded soldiers, under the direction of the U. S. Public Health Service.

Dr. Paul V. Woolley, Kansas City, has been appointed Police Surgeon of Kansas City, succeeding Dr. Chas. R. Revelle, resigned.

(Continued on page 40)

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Photomicrographs of tissue sections must be requested at the time the specimen is sent.

Reports sent as expeditiously as is consistent with correct procedure.
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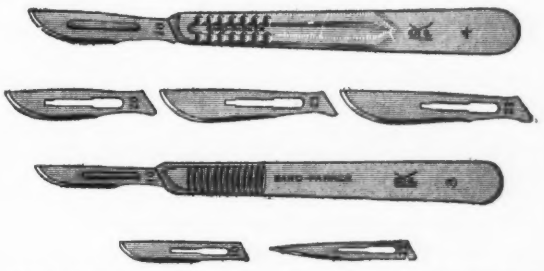

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Pocket Cases for 2 Handles and a dozen Blades. Leather Cases, $1.50. Khaki Cases, $1.00.

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(Continued from page 38)

The Missouri Society for Mental Hygiene was organized in St. Louis on January 13. The following officers were elected: Dr. Malcolm A. Bliss, President; Dr. James F. McFadden, Secretary; Dr. J. E. Wallace Wallin, Treasurer.

Dr. R. E. Castelaw, Superintendent of Wesley Hospital, Kansas City, has resigned and accepted the Superintendency of the Christian Church Hospital, Kansas City.

Dr. Paul C. Schnoebelen, St. Louis, announces the opening of his offices in the Humboldt Building. Practice limited to internal medicine and diagnosis.

Dr. Ephraim D. Hatcher, Granite City, Ill., has been appointed Assistant Physician at State Hospital No. 3, Nevada, Missouri.

Deaths

Dr. Byron N. Stevens, Chillicothe, aged 77, died January 26 from cerebral hemorrhage.

Dr. Gregory S. Miller, St. Louis, aged 45, died December 24.

Dr. Harrison S. Marsh, Kansas City, aged 35, died February 10 following an operation.

Dr. James C. Smith, St. Joseph, aged 63, died January 27.

Dr. John D. McClain, Anniston, aged 73, died January 24.

Dr. William Ambroise Hulen, Kansas City, aged 58, died January 26.

Dr. Isaac N. Enloe, Jefferson City, aged 60, died February 15.

Dr. Hugh P. Mack, St. Louis, aged 57, died January 22.

Dr. William McFarland Brown, Springfield, aged 59, died February 12 from heart disease.

Dr. Oscar H. Helbig, St. Louis, aged 86, died February 7 from senile debility.

Dr. John T. Elder, Syracuse, aged 49, died January 28.

NORTH CAROLINA

The new private pavilion for Mount Sinai Hospital, Mount Sinai, is under construction. The building covers a block. There will be 131 private rooms, out of which 75 have individual balconies. The Mount Sinai group consists of seventeen buildings, ranging in height from two to eight stories. The enlarged hospital will have a capacity of 750 beds.

(Continued on page 42)

Laboratories of Drs. Bunce and Landham

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New Orleans

(Continued from page 40)

Dr. C. S. McLaughlin, Charlotte, has been elected Physician for Mecklenburg County.

Dr. Wilmer L. Grantham, Asheville, announces the association with him of Dr. David W. Harris. Practice limited to urology, syphilology and proctology.

Dr. John V. Hunter has been elected Physician and Quarantine Officer of Randolph County.

Dr. S. L. Russell has been appointed Health Officer of Yadkin County.

Dr. Grover Wilkes has been appointed Physician of Jackson County.

Dr. Vann M. Matthews, Charlotte, and Miss Naomi Fogel, Binghamton, were married January 15.

Deaths

Dr. Theodore Franklin Pharr, Concord, aged 69, died in Charlotte February 12.

Dr. Julius Jackson Barefoot, Graham, aged 36, died February 17 from pneumonia.

OKLAHOMA

New officers elected for Phillips County Medical Society are as follows: Dr. M. Fink, President; Dr. E. T. Brown, Lexa, Vice-President; Dr. J. W. Butts, Secretary-Treasurer.

The following officers have been elected for Woodruff County Medical Society: Dr. R. L. Fraser, President; Dr. R. N. Smith, Vice-President; Dr. L. E. Biles, Secretary-Treasurer.

Drs. Sam McKeel and W. E. Boyce, Ada, have formed a partnership.

Dr. R. L. Kurtz, Nowata, has been reappointed Surgeon for the Missouri Pacific Railway.

A two-story brick building has been purchased by the staff of the Okmulgee Clinic. The first floor will be used for offices, consultation and waiting rooms; the second floor for x-ray, minor operative work and laboratories.

At a recent meeting of the McCurtain County Medical Society the following officers were elected: Dr. A. S. Gray-

(Continued on page 44)

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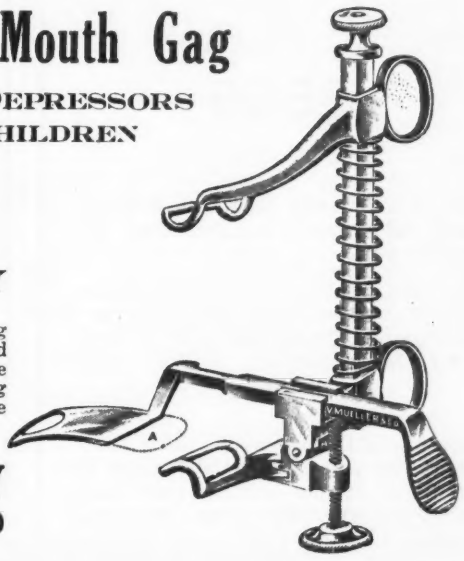

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(Continued from page 42)

don, Idabel, President; Dr. A. W. Clarkson, Valliant, Vice-President; Dr. R. H. Sherrill, Broken Bow, re-elected Secretary-Treasurer.

Dr. C. W. Pendergraft has resigned as Health Officer for Harmon County and has been succeeded by Dr. C. E. Collins, Hollis.

A Public Health Nurses' Institute was held in Oklahoma City February 18-19, under the direction of the State Public Health Association.

A venereal disease clinic has been established at McAlester, with Dr. C. F. Loy in charge.

The Ponca City Hospital has been transferred to the Sisters of St. Joseph, Wichita.

Dr. Walter Howard Miles, Oklahoma City, and Miss Rhoda Bradley, Norman, were married January 1 in Oklahoma City.

Deaths

Dr. Leslie Sherman Skelton, Okmulgee, aged 55, died in Kansas City, Mo., January 28.

Dr. C. B. Dunn, Raiford, aged 75, died February 7.

Dr. J. M. McComas, Elk City, aged 77, died February 24.

SOUTH CAROLINA

The Tri-State Medical Association, of the Carolinas and Virginia, met in Spartanburg February 16-17. The following officers were elected: Dr. William Wallace Fennel, Rock Hill, President; Drs. Hugh R. Black, Spartanburg, John T. Burrus, High Point, N. C., and Karl S. Blackwell, Richmond, Va., Vice-Presidents; Dr. James K. Hall, Richmond, Va., Secretary-Treasurer. The next meeting will be held in Norfolk.

A mental hygiene survey of the State is being conducted by Dr. Victory B. Anderson, of the National Committee of Mental Hygiene. This survey is sponsored by the Child Welfare Commission.

The Florence County Public Health Nursing Association was organized in February. The following officers were elected: Dr. H. Tucker Graham, Chairman; R. W. Sharkey, Vice-Chairman; Mrs. E. E. Howell, Secretary-Treasurer.

At a recent meeting of the Laurens County Medical Society the following officers were elected: Dr. B. O. Whitten,

(Continued on page 46)

NOTICE

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ARE NOW SUPPLIED IN A NEW 10 MIL. (C. C.) CONTAINER

This package has many superior features which assure asepsis, prevent leakage and facilitate the removal of contents. It is constructed on the well known Sherman principle.

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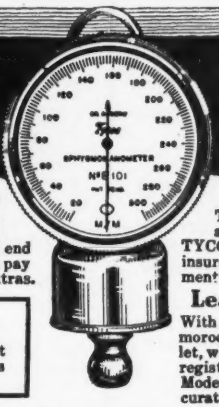

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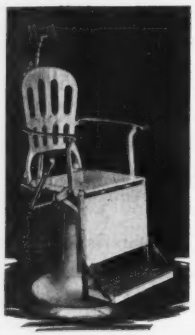

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(Continued from page 44)

President; Dr. John W. Beason, Gray Court, Vice-President; Dr. W. T. Pace, Gray Court, Secretary-Treasurer.

Dr. George McF. Mood, Charleston, City Bacteriologist, has resigned his position and will be succeeded by Dr. Charles D. Boette.

The following have been elected trustees of the South Carolina Medical College: Drs. William W. Fennell, Rock Hill, Harry H. Wyman, Aiken, Olin D. Busbee, Springfield, and William A. Tripp, Anderson.

Deaths

Dr. W. H. Prioleau, Charleston, died February 14.

TENNESSEE

The annex to the King's Daughters' Hospital, Columbia, is completed and ready for the reception of patients. The cost of the annex was $15,000.

Officers elected for McNairy County Medical Association are as follows: Dr. H. C. Sanders, President; Dr. R. M. Kendricks, Vice-President; Dr. W. W. Wallace, Secretary-Treasurer.

According to plans formulated at a recent meeting of the Montgomery County Medical Society, free medical clinics will be established in Clarksville's schools.

New officers for Montgomery County Medical Society are as follows: Dr. J. W. Brandau, President; Dr. R. B. Macon, Vice-President; Dr. H. H. Edmonson, Secretary-Treasurer.

The Robertson County Medical Society has been reorganized. The following have been elected officers: Dr. W. B. Dye, Springfield, President; Dr. J. W. Thomas, Cross Plains, Vice-President; Dr. B. B. Sory, Cedar Hill, Secretary-Treasurer.

The following have been elected officers for Williamson County Medical Society: Dr. Dan German, President; Dr. J. O. Walker, Vice-President; Dr. K. S. Howlett, Secretary-Treasurer.

Officers elected for Dickson County Medical Society are as follows: Dr. G. C. Cannon, President; Dr. H. C. Guerin, Vice-President; Dr. W. J. Sugg, Secretary.

Officers for Roane County Medical Society are as follows: Dr. Thos. H. Phillips, Rockwood, President; Dr. H. M. Carr, Harriman, Vice-President; Dr. G. P. Zirkle, Kingston, Secretary; Dr. John Roberts, Kingston, Treasurer.

The following are officers for Hickman County Medical Society: Dr. J. B. Webb, President; Dr. C. V. Stephenson, Secretary-Treasurer.

Hamblen County Medical Society has elected the following officers: Dr. J. W. Pierce, Tate, President; Dr. F. F. Painter, Morristown, Vice-President; Dr. C. T. Carroll, Morristown, Secretary-Treasurer.

Haywood County Medical Society has elected the following officers: Dr. G. T. Scott, President; Dr. J. C. Norvelle, Vice-President; Dr. J. L. Edwards, Secretary-Treasurer.

It is reported that 190 new patients were cared for by the Knoxville Health Center Clinic during the month of January. This brings the total number of patients helped during the month to 708.

Dr. John P. Lindsey and Miss Ida Belle Queener, both of Pruden, were married February 10.

Deaths

Dr. Joseph Alexander Venable, White Bluff, aged 47, died February 13 from heart disease.

Dr. Thomas Harwell Craig, Johnson's Grove, aged 55, died February 8 following an operation.

Dr. John Iredelle D. Hinds, Nashville, died March 4.

TEXAS

A maternity board, consisting of the Director of Public Health, Director of Public Welfare and a reputable physician, has been established in Dallas. The board will have power to inspect and regulate all maternity homes.

(Continued on page 48)

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(Continued from page 46)

Van Zandt County Medical Society has elected the following officers: Dr. M. L. Cox, Canton, President; Dr. W. H. Terry, Grand Saline, Vice-President; Dr. H. H. Hilliard, Canton, Secretary-Treasurer.

Bowie County Medical Society has elected the following officers: Dr. J. K. Smith, Texarkana, President; Drs. A. G. Lee, Texarkana, and W. E. Womack, Vice-Presidents; Dr. C. A. Smith, Secretary-Treasurer.

Caldwell County Medical Society has elected the following officers: Dr. A. F. Luckett, Fentress, President; Dr. Edgar Smith, Lockhart, Vice-President; Dr. W. H. O'Banion, Lockhart, Secretary-Treasurer.

Childress-Collingsworth-Donley-Hall County Medical Society has elected the following officers: Dr. R. B. Wolford, Childress, President; Dr. J. M. Ballew, Memphis, Vice-President; Dr. D. D. Corss, Wellington, Secretary-Treasurer.

Comal-Guadalupe County Medical Society has elected the following officers: Dr. C. W. Raetzsch, Seguin, President; Dr. R. Wright, New Braunfels, Vice-President; Dr. A. J. Hinman, New Braunfels, Secretary.

Cooke County Medical Society has elected the following officers: Dr. C. B. Thayer, Gainesville, President; Dr. O. E. Clements, Gainesville, Vice-President; Dr. Rufus C. Whiddon, Gainesville, Secretary-Treasurer.

Eastland County Medical Society has elected the following officers: Dr. H. D. Whittington, Eastland, President; Dr. Joseph W. Gregory, Cisco, Secretary-Treasurer.

Fannin County Medical Society has elected the following officers: Dr. J. J. Cappelman, Honey Grove, President; Dr. H. B. Savage, Honey Grove, Vice-President; Dr. W. B. Vaughan, Honey Grove, Secretary-Treasurer.

Fayette County Medical Society has elected the following officers: Dr. Donald McKay, Flatonia, President; Dr. P. Beckman, LaGrange, Vice-President; Dr. J. W. Smith, LaGrange, Secretary-Treasurer.

Galveston County Medical Society has elected the following officers: Dr. Chas. T. Stone, President; Dr. E. M. F. Stephens, Vice-President; Dr. E. D. Crutchfield, Secretary-Treasurer.

Gonzales County Medical Society has elected the following officers: Dr. E. J. Hinton, Wrightsboro, President; Dr. A. B. Parr, Gonzales, Vice-President; Dr. W. T. Dawe, Gonzales, Secretary.

Grayson County Medical Society has elected the following officers: Dr. A. H. Braden, President; Dr. E. R. Birch, Vice-President; Dr. A. W. Acheson, Secretary.

Hidalgo County Medical Society has elected the following officers: Dr. J. G. Harrison, McAllen, President; Dr. J. D. McCann, Donna, Vice-President; Dr. John H. Hunter, McAllen, Secretary-Treasurer.

Jasper-Newton County Medical Society has elected the following officers: Dr. B. A. Sweeney, Newton, President; Dr. R. W. Worthy, Jasper, Vice-President; Dr. W. F. McCreight, Kirbyville, Secretary-Treasurer.

Johnson County Medical Society has elected the following officers: Dr. C. V. Ezell, Cleburne, President; Drs. B. G. Prestridge, El Dorado, and M. T. Knox, Parker, Vice-Presidents; Dr. W. E. Lucey, Cleburne, Secretary-Treasurer.

Kaufman County Medical Society has elected the following officers: Dr. W. I. Swangem, Terrell, President; Dr. P. C. Shands, Forney, Vice-President; Dr. B. J. Hubbard, Kaufman, Secretary-Treasurer.

Kerr-Kendall-Gillespie-Bandera County Medical Society has elected the following officers: Dr. Victor Keidel, Fredericksburg, President; Dr. C. A. McBeth, Harper, Vice-President; Dr. J. D. Jackson, Kerrville, Secretary-Treasurer.

LaSalle-Frio County Medical Society has elected the following officers: Dr. J. A. Bradbrook, President; Dr. E. M. Howard, Vice-President; Dr. J. E. Beall, Secretary-Treasurer.

Mitchell-Nolan County Medical Society has elected the following officers: Dr. Thomas J. Ratliff, Colorado, President; Dr. J. Wells Young, Roscoe, Vice-President; Dr. Alfred A. Chapman, Sweetwater, Secretary-Treasurer.

McCulloch County Medical Society has elected the following officers: Dr. Otha C. Jackson, Voca, President; Dr. J. B. Granville, Brady, Vice-President; Dr. James S. Anderson, Brady, Secretary-Treasurer.

Nacogdoches County Medical Society has elected the following officers: Dr. F. C. Ford, Hamilton, President; Dr. G. P. Campbell, Douglas, Vice-President; Dr. T. J. Blackwell, Nacogdoches, Secretary-Treasurer.

Nueces County Medical Society has elected the following officers: Dr. F. U. Painter, President; Dr. W. C. Barnard, Vice-President; Dr. Eleanor Harthill, Secretary.

Sabine County Medical Society has elected the following officers: Dr. T. B. Morgan, Bronson, President; Dr. C. F. Smith, Hemphill, Vice-President; Dr. W. T. Arnold, Hemphill, Secretary.

Parker-Palo Pinto County Medical Society has elected the following officers: Dr. R. L. Yeager, President; Dr. C. B. Williams, Secretary.

(Continued on page 50)

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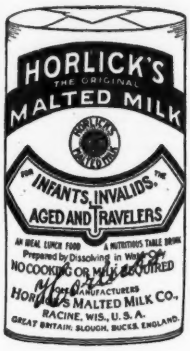

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(Continued from page 48)

Titus County Medical Society has elected the following officers: Dr. T. M. Fleming, Mount Pleasant, President; Dr. A. A. Smith, Talco, Vice-President; Dr. John M. Ellis, Mount Pleasant, Secretary-Treasurer.

Wise County Medical Society has elected the following officers: Dr. S. J. Petty, Decatur, President; Dr. W. L. Russell, Rhome, Vice-President; Dr. L. H. Reeves, Decatur, Secretary-Treasurer.

Under the direction of the American Red Cross, Mrs. Fay Chaney, Baltimore, has started active work as Public Health Nurse for Palo Pinto County.

Dr. J. D. Blevins, Beaumont, has been named Assistant State Health Officer.

The Seventh District Medical Society met in Austin February 10. The officers are: Dr. A. A. Ross, Lockhart, President; Dr. Edmund Doak, Taylor, Vice-President; Dr. Morris H. Boerner, Austin, Secretary.

Dr. Holman Taylor, Fort Worth, has been elected President of the Tarrant County Tuberculosis Society.

Dr. Jeffe Franklin Gamble, Captain, M.C., U. S. Army, and Miss Leah M. Abadie, both of Houston, were married in Des Moines, Iowa, January 11.

Deaths

Dr. John G. Rushing, Center, aged 41, died January 25 from effects of injuries received when he was kicked by a horse.

Dr. Nathan Moody Dewees, Palacios, aged 59, died February 3 from carcinoma of the stomach.

Dr. Henry Stow Garlick, Laredo, aged 45, died February 9 from pneumonia.

Dr. Andrew J. Sanders, Aubrey, aged 59, was killed February 16, when the automobile in which he was riding was struck by a passenger train.

Dr. Otto Ehlinger, College Station, aged 52, died February February 14 from heart disease.

VIRGINIA

The Albemarle Hotel, Petersburg, has been purchased for a hospital. The cost of remodeling and equipping the building will amount to approximately $30,000.

Dr. J. A. Hart has been appointed Acting Assistant Surgeon of the U. S. Public Health Service and assigned to the immigration service in Norfolk.

Deaths

Dr. William T. Fuller, Suffolk, aged 54, died February 5.

Dr. Robert Alexander Black, Hot Springs, aged 60, died February 14 from heart disease.

WEST VIRGINIA

It is reported that the Williamson Hospital Building will be taken over by Drs. H. D. Hatfield, A. K. Kessler, J. E. Rader and C. T. Taylor, Huntington, and operated as a private institution. Improvements on the building will amount to approximately $40,000.

The Professional Building, Charleston, has been completed and will be occupied almost exclusively by doctors and dentists.

Deaths

Dr. John J. Liggett, Martinsburg, aged 74, died February 16.

Dr. S. A. Washington, Hilltop, aged 60, died January 14 from pneumonia.

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